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Agricultural Experiment Station

BULLETIN NO. 128

TEN GENERATIONS OF CORN BREEDING

BY LOUIE H. SMITH



URBANA, ILLINOIS, SEPTEMBER, 1908

SUMMARY OF BULLETIN No. 128

1.. The results of ten years experiments in breeding corn to modify the composition of the grain and thereby adapting it to various special purposes are here reported.

2. Starting with a variety of average composition, it has been possible by selection and breeding, in ten generations: (1) to increase the average protein content from 10.92 to 14.26 percent; (2) to decrease the average protein content from 10.92 to 8.64 percent; (3) to increase the average oil content from 4.70 to 7.37 percent; (4) to decrease the average oil content from 4.70 to 2.66 percent. In other words, out of a single variety of corn two strains have been developed of which one is now almost twice as rich in protein as the other, and two other strains have been developed, one of which is now nearly three times as rich in oil as the other.

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3. Variations among individual ears have been found ranging in protein content from 6.13 percent in the low-protein strain, to 17.79 percent in the high-protein strain, and in oil content from 1.60 percent in the low-oil strain to 8.59 percent in the high oil strain.

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4. Climatic conditions exert, in certain years, a marked effect upon the composition of the corn crop as regards its protein, oil, and starch content.

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5. Altering the composition of the grain has produced no very marked effect upon the composition of other parts of the corn plant.

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6. Continued selection appears to have induced a certain correlation between protein and oil content.

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7. Selection for the composition of the grain has resulted in characteristic types of kernel.

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8. Perceptible modifications in the type of ear have likewise been wrought.

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9. Selection for high-protein is evidently accompanied by a reduction in yield. In the other strains the yields for the most part have been maintained in spite of the rigorous selection for the special chemical characteristics.

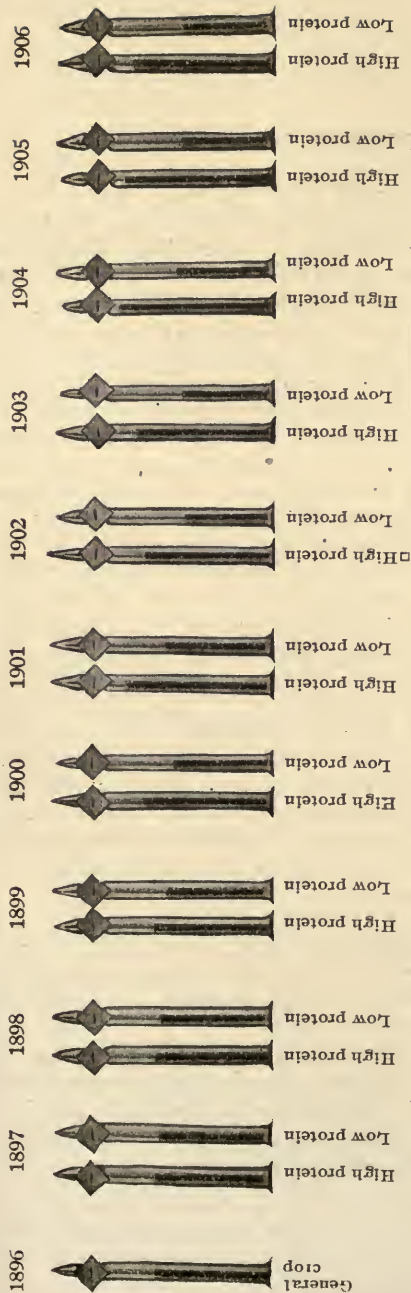
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10. The detailed plot records of each of the four strains and the analytical results of nearly 5000 individual ears which have been analyzed during the ten years' work are placed on record in the appendix to this bulletin in such arrangement that the maternal pedigree record of every ear is shown.

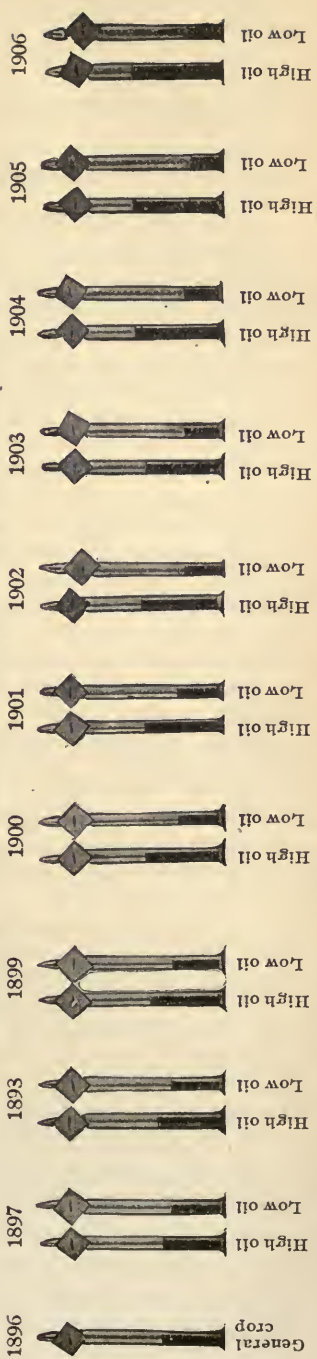
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11. These four breeding plots are still being continued.

PHOTOGRAPH I. TEN YEARS CORN BREEDING FOR HIGH AND LOW PROTEIN



PHOTOGRAPH II. TEN YEARS CORN BREEDING FOR HIGH AND LOW OIL



Photograph I illustrates the results of breeding corn for increase and decrease of protein content; Photograph II, for increase and decrease of oil content. The bottles show the amount of protein or oil contained in one-tenth bushel of corn from the crop of the different strains each season for the first ten generations.

INTRODUCTORY NOTE

BY CYRIL G. HOPKINS, CHIEF IN AGRONOMY

In 1896 the Illinois Experiment Station began the improvement of corn by varying the composition of the grain through selection and breeding. The results of the first two years of these investigations were published in Bulletin No. 55 "Improvement in the Chemical Composition of the Corn Kernel." This same work has been carried on continuously since that time, and although several publications have been issued in the meantime bearing upon different phases of the subject of corn improvement as it has been developed, including Bulletins 82, 87, 100, and 119, there has, however, been no complete report published of the results obtained in the progress of this original line of work described in Bulletin No. 55.

It is the present purpose therefore to present the results which have been obtained, in the first ten generations, in improvement in composition in various directions, namely, for high protein, for low protein, for high oil and for low oil, of the single variety of corn from which these four different strains have been produced, and which is known as "Illinois" corn.

Since the discovery of the possibility of improving corn for special adaptation and the general recognition of its importance, this Station has extended its work to other standard varieties of corn best adapted to different sections of the state, applying the methods and principles worked out in the original experiments with the "Illinois" variety. This work of improving the other standard varieties both for yield and for special adaptation is being carried on largely in co-operation with seed corn breeders of the state. A large amount of data relating to this later work has already accumulated, but it is proposed to reserve this for future publication rather than to attempt to cover in this report all of the corn breeding work now in progress believing that such a division of the subject will allow a clearer presentation.

Inasmuch as the editions of Bulletins 53 and 55 are already exhausted and the demand for the information contained therein is still unsatisfied, it is proposed to make the nature of this report as complete a presentation of the investigation as is possible without making too great repetition of material already published.

For several years Professor Louie H. Smith has been largely responsible for the conduct of these investigations, valuable assistance having also been rendered during recent years by Doctor E. M. East, now agronomist at the Connecticut Experiment Station, Mr. R. W. Stark, now chief chemist for the Cuban Experiment Station, Mr. H. H. Love, and Mr. C. H. Myers.

TEN GENERATIONS OF CORN BREEDING

BY LOUIE H. SMITH, ASSISTANT CHIEF IN PLANT BREEDING

IMPORTANCE OF CORN IMPROVEMENT

Aside from the purely scientific interest attached to this work, the practical importance of improvement of corn to adapt it for special purposes as well as for increased yield is now becoming generally recognized. The significance of improving the chemical composition of corn has already been pointed out in Bulletins 55, 82, 87, and 100 of the Illinois Experiment Station, and it is scarcely necessary to dwell upon this phase of the subject further than to refer briefly to some of the demands for corn improved along these particular lines.

No other crop is made to serve such a variety of purposes as corn, and in consideration of these many different uses is suggested the question of special adaptation.

Purpose of increasing the protein.—In the nutrition of man and beast protein is the most expensive nutrient. Of all of our American food stuffs corn is the cheapest, because of its economical production. But because corn does not contain sufficient protein for most purposes of feeding, it must be re-inforced by other more expensive food stuffs in order to obtain the proper ratio of this important nutrient. It is from these considerations that farmers, and especially stock feeders, recognize the importance of breeding corn for increase of protein content.

Purpose of decreasing the protein.—On the other hand, there is a demand from the manufacturers of those products which are derived from the starch of corn such as glucose, gum, dextrine, syrup, and alcohol, for a corn having a large proportion of carbohydrates and not so rich in protein. The practical effect of decreasing the percent of protein is to increase the percent of starch; therefore, for such purposes there should be a place on the market for corn which is bred for decrease of protein content.

Purpose of increasing the oil.—The oil of corn has in recent years found such a wide commercial use that under the present market conditions, it has become, pound for pound, by far the most valuable constituent of the grain, and whereas formerly in the glucose factories and corn mills the germs containing the oil were

almost a waste product, there is now an actual demand on the part of these industries for corn which is richer in oil. It is proposed to meet this demand by breeding corn for increase of oil content.

Purpose of decreasing the oil.—There is also a practical use for corn with a low oil content. It has been found by investigation that in feeding swine, the oil in the corn tends to produce a soft, flabby quality of flesh which is very undesirable, especially for our export trade where the demand of the market is for a hard, firm product. A remedy for this lies in the reduction of the oil content of the corn which is fed. Thus here we have a very important practical object for breeding corn for decrease of oil content.

These special purposes mentioned for which corn is being improved suggest the possibility of many others demanded by the various industries which utilize the corn crop and which require different qualities in it.

Corn improvement should, of course, embrace quantity as well as quality and in all practical work of selection looking toward improvement, the matter of increased yield per acre should be given first consideration. Recognizing the importance of this principle, the methods used in these experiments have been chosen with the view of maintaining or increasing the yield, and productiveness is made the basis of the first selection, even sometimes at a sacrifice in percentage of the desired chemical constituent.

FUNDAMENTAL PRINCIPLES

Before taking up this work of the improvement of corn by systematic selection and breeding, it was necessary to make a preliminary study of the subject such as is reported by Doctor Hopkins in Bulletin 53 "Chemistry of the Corn Kernel." In this study a large amount of valuable knowledge was gained which bears upon the technical side of the work, such as the chemical principles involved and the laboratory manipulations upon which the success of the entire work so intimately depends. Further, important data were obtained from which were derived the principles of selection upon which all of this work in improvement of the composition of corn is based. All improvement by selection and breeding depends, of course, upon variation, therefore it was necessary to make a preliminary study in order to learn how corn varies with respect to its composition. As the result of such an investigation the following data were obtained:

Analysis of parts of the ear.—In studying this question 30 duplicate analyses were first made on different parts of ears. Five ears were divided lengthwise into 3 samples each in the following

manner: If the ears were 12-rowed, 3 samples of 4 consecutive rows each were made; if 16-rowed, 3 samples of 5 consecutive rows each were made, one row being left, etc., etc.

Duplicate analyses of 15 samples thus prepared from 5 different ears gave the results shown in Table I. The different ears are distinguished by the letters (a), (b), (c), (d), and (e).

TABLE I.—VARIATION IN COMPOSITION IN SAMPLES FROM THE SAME EAR AND FROM DIFFERENT EARS

Sample & Ear.	Ash.	Protein.	Oil.	Carbohydrates.
1 (a)	{ 1.42 1.43	10.79 10.75	4.57 4.58	83.22 83.24
2 (a)	{ 1.48 1.47	10.97 10.94	4.54 4.51	83.01 83.08
3 (a)	{ 1.50 1.51	10.66 10.72	4.53 4.55	83.31 83.22
4 (b)	{ 1.51 1.52	12.00 11.98	4.60 4.59	81.89 81.91
5 (b)	{ 1.49 1.48	12.01 12.05	4.57 4.57	81.93 81.90
6 (b)	{ 1.48 1.47	12.19 12.08	4.85 4.80	81.48 81.65
7 (c)	{ 1.37 1.37	10.09 10.10	5.24 5.17	83.30 83.36
8 (c)	{ 1.31 1.34	10.14 10.18	5.08 5.18	83.47 83.30
9 (c)	{ 1.36 1.37	10.15 10.20	5.20 5.17	83.29 83.26
10 (d)	{ 1.39 1.38	10.46 10.46	4.28 4.29	83.87 83.87
11 (d)	{ 1.43 1.42	10.25 10.27	4.22 4.20	84.10 84.11
12 (d)	{ 1.43 1.45	10.09 10.06	4.16 4.15	84.32 84.34
13 (e)	{ 1.34 1.36	11.19 11.20	4.80 4.78	82.67 82.66
14 (e)	{ 1.30 1.28	10.66 10.62	4.91 4.89	83.13 83.21
15 (e)	{ 1.36 1.36	10.81 10.92	4.83 4.79	83.00 82.93

These results indicate uniformity in the composition of different parts of the ear. The following shows the greatest total variation in the 6 single determinations of each constituent in any one ear; and also the total variation between the different ears.

	Ash.	Protein.	Oil.	Carbohydrates.
In any single ear.	.09	.58	.28	.55
In five ears	.24	2.13	1.09	2.86

Another lot of five ears was selected and each of these was divided crosswise into 3 samples of approximately equal amounts, which for convenience are designated "tip," "middle" and "butt," the ears being lettered (f), (g), (h), (i) and (j). The results of the duplicate analyses are given in Table 2.

It is observed that in every case the tip is the lowest in protein and that usually the middle is lower than the butt, the average total difference in the ear being 0.73 percent and the widest 1.13 percent as shown in the total variations following Table 2.

The variation in ash and oil is small and shows no such peculiarity. The carbohydrates, being determined by difference, appear, of course, as the complement to the sum of the other substances and show in the opposite direction approximately the variation of the most variable determinable constituent.

Partial analyses of single kernels.—For the work on ash content several ears of corn were selected, and from each a sample of corn, consisting of a number of rows of kernels and believed to fairly represent the ear, was taken and its percentage of ash in the dry matter determined. Then for special investigation of ash content of single kernels four ears from the lot were chosen, of which two were high and two low, comparatively, in percentage of ash as previously determined. From each ear 10 kernels were selected at approximately equal distance throughout the length of the ear, the kernels being numbered from 1 to 10 and the order running from tip to butt. The data from the ash determination in single kernels and also percentage of ash in the large sample from the same ear are given in Table 3.

TABLE 2.—VARIATION IN COMPOSITION IN BUTT, MIDDLE AND TIP PORTIONS OF THE SAME EAR AND OF DIFFERENT EARS

Sample & Ear.	Ash.	Protein.	Oil.	Carbohydrates.
16 (f) Tip	{ 1.58 1.59	11.78 11.76	5.09 5.10	81.55 81.55
17 (f) Middle	{ 1.58 1.57	12.22 12.26	5.13 5.03	81.07 81.14
18 (f) Butt	{ 1.56 1.58	12.36 12.42	5.04 5.03	81.04 80.97
19 (g) Tip	{ 1.49 1.49	11.99 11.97	4.86 4.84	81.66 81.70
20 (g) Middle	{ 1.51 1.51	12.49 12.49	4.77 4.76	81.23 81.24
21 (g) Butt	{ 1.50 1.51	13.02 13.10	4.57 4.59	80.91 80.80
22 (h) Tip	{ 1.37 1.35	9.72 9.67	3.90 3.93	85.01 85.05
23 (h) Middle	{ 1.37 1.35	10.07 10.08	3.98 3.97	84.58 84.60
24 (h) Butt	{ 1.51 1.49	10.49 10.46	4.01 4.00	83.99 84.05
25 (i) Tip	{ 1.47 1.48	10.58 10.61	4.58 4.60	83.37 83.31
26 (i) Middle	{ 1.45 1.44	11.05 11.03	4.56 4.60	82.96 82.93
27 (i) Butt	{ 1.47 1.48	11.03 10.96	4.48 4.46	83.02 83.10
28 (j) Tip	{ 1.77 1.74	10.87 10.78	4.36 4.37	83.00 83.11
29 (j) Middle	{ 1.65 1.62	11.35 11.31	4.56 4.58	82.44 82.49
30 (j) Butt	{ 1.71 1.72	11.32 11.28	4.28 4.29	82.69 82.71

The following shows the total variation:

	Ash.	Protein.	Oil.	Carbohydrates.
In any single ear....	.16	1 13	.30	1.06
In five ears.....	.42	3.43	1.23	4.25

TABLE 3.—VARIATION IN ASH CONTENT IN KERNELS FROM THE SAME EAR AND FROM DIFFERENT EARS

Kernel No.	Ear No. 1	Ear No. 2	Ear No. 3	Ear No. 4
1	1.50	1.64	1.10	1.14
2	1.57	1.64	1.08	1.23
3	1.61	1.63	1.09	1.13
4	1.56	1.65	1.10	1.17
5	1.67	1.59	1.07	1.13
6	1.69	1.63	1.09	1.22
7	1.71	1.68	1.07	1.25
8	1.64	1.65	1.10	1.19
9	1.64	1.70	1.21	1.11
10	1.74	1.60	1.11	1.10
Composite of ear	1.73	1.65	1.10	1.11

These results confirm those of the previous experiments in indicating uniformity in the composition of the ear in all parts, although, of course, slight variations are found.

In the work on the protein content of single kernels, 5 ears, 3 of which were high and 2 relatively low in protein, were selected from a number of ears in a manner analogous to that described in the previous experiment. In Table 4 are shown the results of these protein determinations.

TABLE 4.—VARIATION IN PROTEIN CONTENT IN KERNELS FROM THE SAME EAR AND FROM DIFFERENT EARS

Kernel No.	Ear No. 1	Ear No. 2	Ear No. 3	Ear No. 4	Ear No. 5
1	12.46	12.17	11.53	7.45	7.72
2	12.54	12.94	12.32	7.54	8.41
3	12.44	12.51	12.19	7.69	8.37
4	12.50	13.42	12.54	7.47	8.31
5	12.30	13.12	12.14	7.74	8.02
6	12.49	14.59	12.95	8.70	8.76
7	12.50	13.21	12.84	8.46	8.89
8	12.14	13.43	.....	8.69	9.02
9	12.14	13.16	12.04	8.86	8.96
10	12.71	14.05	12.75	8.10	8.89
Composite of ear	13.06	13.87	12.96	7.59	8.40

Here in the protein content, as in the case of the ash, we find on the one hand comparative uniformity among different kernels of a single ear and on the other, marked variation among different individual ears.

The results of these analyses of different ears from a single variety together with analyses of different parts of single ears establish beyond question two important fundamental facts upon which all of this subsequent work of selection and breeding is founded.

The statement of these facts is as follows:

(1) *The ear of corn is approximately uniform throughout in the chemical composition of its kernels.*

(2) *There is a wide variation in the chemical composition of different ears of the same variety of corn.*

With these two principles established, we have a working basis for the chemical selection of seed corn. With uniformity in the individual ear, it is possible to determine very approximately the composition of the grain by analyzing a sample consisting of a few rows of kernels, and this is the actual practice in the examination of individual ears. If the ear represented by this sample is found to be desirable for seed, the remainder of the kernels of the ear may then be planted.

The wide variation in composition between different ears of the same variety is a very important factor in the selection of seed; as a starting point is thus furnished in each of the several lines of desired improvement.

It is to be observed that this principle of uniformity within the individual, and variation as between different individuals within the variety, holds not only for the chemical composition of the kernel but it applies as well to other characteristics such as the structure, for example, and whenever any such characteristic is related to productiveness or other utility of the crop, it should be taken into account in the breeding.

GENERAL PLAN OF THE EXPERIMENTS

In the general plan of these experiments, it was proposed to determine the influence upon the chemical composition of corn by selection and breeding in the four directions namely, (1) for increase of protein content, (2) for decrease of protein content, (3) for increase of oil content, (4) for decrease of oil content.

The method employed was as follows:

For the first selection a large number of ears were analyzed both for protein and for oil. In the high protein breeding, for example, the 24 ears highest in protein were selected for seed and planted in a plot isolated from other sorts of corn, each ear in a separate row.

These rows were harvested separately and the seed for the next planting was selected from ears of this crop which were found to be highest in protein, repeating this process each year. The breeding for low protein and for high oil and low oil was conducted on the same plan. Under this system each selection rapidly gave rise to a "pure" strain. As each original ear had its own register number and as all succeeding ears bore corresponding numbers the exact pedigree of each row (on the female side) was at all times fully known.

This general method has been maintained from the beginning, although some minor modifications of details have been made from time to time during the progress of the work as experience indicated as being desirable or as necessity demanded.

THE BREEDING PLOT

The size of the breeding plot has varied in the different plots and in the different years. The number of rows included in any plot is always given in the plot records.

The locations of these breeding plots have always been chosen with reference to their isolation from other corn fields in order to prevent cross fertilization from other kinds of corn. It is quite difficult with so many corn experiments as are carried on at this Experiment Station to obtain conditions that are ideal in this respect, but by taking advantage of tall hedge rows, and other barriers, prevailing winds, and other corn fields of the same strain, there has been but slight, if any, admixture in these breeding plots. A system of alternating the locations of the breeding plots of the opposite strains has been carried out. For example, after the first two years the locations of the high-protein and the low-protein plots were reversed; that is the high-protein plot was planted on the same ground that the low-protein plot had occupied the two preceding years and *vice versa*. After two years more these plots were shifted back to their original locations. The high-oil and low-oil plots were managed in the same manner. The design of this alternation of location of the plots was to provide something of a check upon the possible influence of soil upon the composition

of the crops. The plots have been changed to other locations in later years but this system of alternating has been maintained. For each of these breeding plots there is now provided a double area which makes possible a crop rotation system including clover and other legumes, for maintaining the productivity of the land.

CULTURAL CONDITIONS

The cultural methods, including the preparation and cultivation of the soil, planting, harvesting, and handling of the crop on these breeding plots have been such as is considered good practice in ordinary corn growing. The seed has always been planted in hills in preference to drills. The present practice is to plant the hills three feet apart each way and to allow two stalks to the hill.

Attention is paid to the matter of preventing the distribution of pollen from weak, barren or otherwise undesirable plants by detasseling all such plants at the proper time.

After discovering the great advantage to be gained by the method of detasseling alternate rows and taking seed only from such detasseled rows, as pointed out in Bulletin 100, this system has been applied to all of our regular breeding plots.

The method of harvesting has been that of cutting and curing in the shock.

SAMPLING AND SELECTING

In the earlier years of the experiments a sample from each of all of the rows was reserved by selecting a certain number of the choicest ears as judged from their physical appearance. But as the possibility of improvement became more clearly established, a system was adopted by which seed ears for the next year's planting are taken only from those rows which prove to be most productive as determined by the weight of ear corn produced, all other rows of the plot being rejected as a source of seed, and since the introduction of the system of detasseling alternate rows, only the best of the detasseled or "dam" rows have been selected. This method of selecting the choicest ears to represent the plot-row has been followed throughout the work although details of the system as regards the number of ears taken have been somewhat modified in the different years, as will appear in connection with the data which follow in the appendix.

The ears, thus chosen on account of their physical superiority, are then subjected to chemical analysis and from the results of these analyses is made the final selection of seed for the succeeding season.

In the sampling for these analyses two rows of kernels are taken lengthwise of the ear to represent the composition of the individual ear. At the same time composite samples to represent the selected plot-rows are taken by mixing together one row of kernels from each selected ear of the respective plot-rows. Each seed ear thus selected is given a permanent "Register Number" which designates that ear for all future reference.

REGISTERING

By our system of numbering the "Register Number" shows at the same time the number of the ear and the generation of the breeding. This is done by starting the first year in the 100 series numbering the ears to be planted in succession from 101, and the second generation starting with the 200 series running up from 201 and so on, starting each succeeding year of the breeding with a higher hundred. Thus Ear No. 1018 shows that this ear belongs to the tenth generation and was planted in row 18 of the breeding plot of that year. The "Dam No." is the register number of the parent ear and is useful in tracing the pedigree record from year to year. The "Annual Ear No." is simply a temporary number given to each ear to be used during examination for selection and as soon as the selection of the seed ears has been determined and the arrangement for planting has been decided the ears are given their permanent register numbers.

A description of the physical as well as the chemical characteristics of all the seed ears is kept on record including length of ear, tip circumference of ear, butt circumference of ear, number of rows of kernels, number of kernels in row, weight of ear, weight of cob, tip circumference of cob, and butt circumference of cob. Besides this numerical description a photograph record is also kept of every ear planted.

The performance record of each seed ear is shown by the weight and number of ears produced as well as the average composition of its progeny.

For a more detailed description of the system of registry used in our corn breeding work the reader is referred to Bulletin 100.

VARIETY

The variety of corn selected for this investigation was one of medium size and of safe maturity for this latitude. It has been grown upon the Experiment Station farm every year since 1887. Previous to that time it had been carefully grown for several years

by Mr. F. E. Burr of Champaign county, and it was known locally as Burr's White; and this name was used in our records until 1903, when it was decided to change the name to "Illinois." The fact that these strains of corn are no longer typical Burr's White, and the fact that this corn was carefully grown for several years prior to 1896 by the Illinois Experiment Station and that since that time it has been most carefully bred by this Station for improvement in both yield and quality, so that there have been developed from this variety four different strains of corn each of which has an established pedigree now covering ten generations,—these facts have seemed to justify giving this corn a name which shall be distinctive and which shall also show its Illinois breeding; and now it is known in the records and publications of the Illinois Experiment Station as "Illinois" corn, the four different strains being designated as:

1. "Illinois High-Protein."
2. "Illinois Low-Protein."
3. "Illinois High-Oil."
4. "Illinois Low-Oil."

FIRST SELECTION OF SEED

From the 1896 crop of Burr's White corn grown upon the Experiment Station farm about two bushels (163 ears) of good sound ear corn suitable for seed were taken. From each ear a sample consisting of three rows of kernels lengthwise of the ear was taken for analysis. The results of these analyses are given in the first table of the appendix (Table 15). The data obtained show remarkable variation in the relative proportions of the different constituents. The ash varies from 1.10 to 1.74 percent, the protein from 8.25 to 13.87 percent, the oil from 3.84 to 6.02 percent and the carbohydrates from 78.92 to 85.70 percent. This is a good illustration of the variation in composition existing among individual ears of the same variety and indicates something of the possibilities for selection.

According to these variations there were taken from the 163 ears four groups,—(1) a set of twenty-four ears whose percentage of protein was comparatively high, (2) a set of twelve ears each of which contained a low percentage of protein, (3) a set of twenty-four ears high in oil content, (4) a set of twelve ears low in oil content.

These ears were taken as indicated in the last two columns of Table 15, for the seed with which to start the four respective breeding plots.

It is believed that the interest in this investigation is such as to demand the publication of a complete record of the results in detail, but this data forms such a mass of material as to make it seem advisable to place it in an appendix to this bulletin and to summarize here only the yearly averages which show very well the general results of the work. The reader who may be interested in further detail of the experiments at any point is therefore referred to the appendix (pages 489 to 575) where will be found the complete data recorded in systematic arrangement. (If not attached to this copy, the appendix will be sent upon request).

BREEDING TO INFLUENCE THE PROTEIN CONTENT

In order to obtain a general survey of these experiments to influence the protein content of corn the following table is compiled from the general averages obtained each generation from the corresponding tables given in the appendix:

TABLE 5.—TEN GENERATIONS OF BREEDING CORN FOR INCREASE AND DECREASE OF PROTEIN

Year	High-protein plot, average percent protein.		Low-protein plot, average percent protein.		Difference between crops, percent.
	In seed planted.	In crop harvested.	In seed planted.	In crop harvested.	
1896	.....	10.92	....	10.92	.00
1897	12.54	11.10	8.96	10.55	.55
1898	12.49	11.05	9.06	10.55	.50
1899	13.06	11.46	8.45	9.86	1.60
1900	13.74	12.32	8.08	9.34	2.98
1901	14.78	14.12	7.58	10.04	4.08
1902	15.39	12.34	8.15	8.22	4.12
1903	14.30	13.04	6.93	8.62	4.42
1904	15.39	15.03	7.00	9.27	5.76
1905	16.77	14.72	7.09	8.57	6.15
1906	16.30	14.26	7.21	8.64	5.62

From this arrangement of the data we may compare the results of the different seasons and at the same time observe the relations between the two plots, thereby enabling us to follow the progress of the breeding from year to year.

Starting with the crop of 1896 with an average protein content of 10.92 percent, as represented by the original 163 ears, the average of the seed ears selected for the high-protein plot of 1897 was 12.54 percent while at the same time low-protein seed ears were

selected which averaged 8.96 percent. The crop harvested from the high-protein plot in 1897 gave an average of 11.10 percent of protein while the average of the corresponding low-protein plot was 10.55 percent. Then selecting again the highest-protein ears out of this year's crop from the high-protein plot, seed for the following year was obtained which averaged 12.49 percent. Selecting the lowest protein ears from the low-protein plot, the seed for this plot in 1898 averaged 9.06 percent.

Repeating this process each year the effect has been in a general way to gradually increase or decrease the protein content in the corn according to the selection.

In glancing over the records there are a few irregularities to be seen. Comparing the results of the season of 1898 with that of the preceding year we seem to have lost a little ground in the high-protein breeding, and in the low-protein plot there was no advance made.

The next year however, following a more favorable seed selection in each case, good gains were made in both directions in 1899, and the same is true of the year 1900.

In 1901 the results are abnormal and here we have a striking illustration of the effect which may be produced by the climatic conditions of the season upon the composition of the crop. This year the protein rises abnormally high in the high-protein crop gaining 1.8 percent over that of the year before and in the low-protein crop, instead of getting the expected decrease this year the protein content rises to over ten percent, thus reverting back to a point higher than it had been for two generations. The season of 1901 was an extremely dry one and from the lack of sufficient moisture much of the corn did not properly "fill out." In the formation of the kernel the proportion of protein is greatest in the younger stages of growth and this proportion gradually diminishes as the carbohydrates are deposited. If the conditions are such that this deposition of carbohydrates is checked, as they were this season, the corn comes to maturity with an abnormally large proportion of protein.

In the case of the high-protein plot the damaging effect of this drouth was so pronounced as to render the crop almost a total failure. The yield of ear corn amounted to only about six bushels per acre and consisted mostly of mere nubbins. On account of the scarcity of ears, it was impossible to follow the regular system of sampling, so the entire product from each plot-row was collected and all of the sound ears and even many nubbins were selected for

analysis in order to obtain the results of the year and to get any sort of seed with which to maintain the experiment. The composite samples representing the high-protein crop are therefore not obtained from the best twenty ears from each plot-row according to the regular system but they were taken from all of the corn fit to analyze from each row. Thus there were altogether only 60 individual ears from which only five were chosen for seed as being fit to plant. Fortunately it was possible to supplement these with some seed ears from our "Special High-protein" plot which was being carried on for another experiment but which was planted from the same strain as the regular high-protein plot so that these ears could be substituted without disturbing the pedigree record. The low-protein plot did not suffer so badly from the drouth, so that here the sampling and selection were made as usual.

During the season of 1902 the climatic conditions as regards rainfall were just the opposite to those of the previous year and we observe in the results obtained precisely the opposite effect. With the very wet season this year we have a great diminution of protein content in the corn in the high-protein as well as in the low-protein plot.

This seasonal condition which seems to have such a marked influence upon the composition of the corn is quite significant. The season of 1901 was very dry and it was attended by an abnormally high protein content in all the corn examined that year. The season of 1902 was unusually wet and the general tendency was to produce corn low in protein. These results are in accordance with those of other investigations, particularly in irrigation experiments where it has been observed that the quantity of water supplied has a direct influence upon the composition of corn, wheat, and oats, the protein content of the grain decreasing as the water supply increases. These results support what seems to be a general principle namely, that a lack of moisture tends to increase the proportion of protein and abundance of moisture reduces it, due, of course, to the effect of water supply upon carbohydrate formation.

With a fairly normal season in 1903 the high-protein crop made a notable advance, but the low-protein in spite of the extremely low content of the seed this year did not go down to the point attained in the low-protein season of the previous year, and in fact we have never been able since to bring it back to the extremely low point reached that year.

The season of 1904 appears to have been another one favorable to the production of protein, for the high-protein plot made a gain

of two percent this year and reached its maximum figure, 15.03 percent, a point which has not since been attained. The low-protein plot shows a similar effect, for instead of decreasing this year, it goes up to 9.27 the highest average percentage in the last five generations of the breeding.

In 1905 as might be expected the content in the high-protein crop was not so high as in the preceding high-protein season. In the low-protein plot a good gain was made this year for low-protein.

In 1906 the percentage in the high-protein was still lower than in 1905 while in the low-protein crop, the percentage was a little higher than in the year before although the difference is not great.

The figures in the last column of the table showing the difference between the percentages of protein in the two crops produced each year are perhaps most instructive because they show the real progress attained in the breeding. They enable us to appreciate more fully the scientific value of breeding for high protein and low protein simultaneously and thereby obtaining a control upon the work which serves to eliminate the question as to the effect of seasonal tendencies in either direction.

These figures practically show a continuously increasing separation between the high-protein and the low-protein strains as the breeding advances up to 1906 so that with the exception of two slight regressions, whether the tendency of the season has been toward the production of high-protein corn or low-protein corn, the force of an hereditary influence is demonstrated always to have been in operation.

It is to be recognized of course that there are practical limits both maximum and minimum to which this matter can be carried and we should expect to finally reach a state where we would interfere with the normal physiological functions of the seed.

As to whether this last year's result in which no more gain was made in the difference between the high and low, is to be taken as indicating that we have reached these limits cannot yet be positively decided. It seems scarcely probable that with seed still unimpaired in vitality and developing into normal healthy plants furnishing otherwise normal crops that the ultimate limits should be at hand. It is proposed still to keep up the selection along these lines and the outcome of the next few years will be awaited with interest.

The results of these experiments thus far show that starting with a single variety of corn, it has been possible in ten generations

by these methods of selection and breeding to increase the protein content from 10.92 percent in the original to 14.26 percent, thus making a gain of 3.34 percent, and at the same time by breeding in the opposite direction it has been possible to reduce the protein content from 10.92 percent to 8.64 percent, making a reduction of 2.28 percent, thus producing a total difference between the two strains of 5.62 percent. In other words the composition of this variety of corn has been so modified that two strains have been developed, one of which is now nearly twice as rich in protein as the other.

MIXED-PROTEIN PLOT

In order to eliminate the question as to whatever influence the soil might exert on the protein content of the corn an experiment was undertaken in which high-protein and low-protein seed were planted together in one plot, our so-called "Mixed-Protein Plot," where the two strains must develop under identical surrounding conditions.

The description and results of the first year of this experiment are given in Bulletin 55. The first year this mixed-protein plot contained five rows of ten hills each. In each hill were planted two kernels of high-protein corn on one side and two kernels of low-protein on the opposite side in such manner that the resulting plants could be identified.

When the crop was harvested eight to ten ears were selected from each kind of corn from each row and from these ears composite samples were made for analysis. These analyses showed that the average protein content of the corn from the high-protein seed was invariably higher than in that produced from the low-protein seed.

This same experiment was repeated in a somewhat larger plot in 1899 and also in 1900. (See Tables 96, 97 and 98 in the appendix for details).

The differences in protein content between the crops from high-protein and low-protein seed were 1.25 percent in 1898, 2.58 percent in 1899, and 2.86 percent in 1900.

Besides these composite samples there were analyzed from the mixed-protein plot of 1899, 137 pairs of ears in which each pair consisted of an ear produced from a high-protein kernel and one from a low-protein kernel and growing together in the same hill. The results of these analyses are given in Table 99 of the appendix and they show an average difference of 2.58 percent to be attributed positively to the influence of the seed selection. But with still further interest, it is to be noted that among these 137 different

pairs, there are only ten cases in which the higher percentage of protein is not found in the ear produced from the high-protein kernel. The most notable of these exceptions occurs in case of Row No. 2, Hill No. 11 where the low-protein kernel produced an ear 3.73 percent higher in protein than the ear resulting from the high-protein kernel. However, these abnormal individual variations are to be expected and they have frequently been observed throughout all of these experiments.

The results of these experiments with the mixed-protein plots during these three different years establish beyond question the fact that the protein content of the corn crop is influenced directly by the seed planted, independently of soil, seasonal, or cultural conditions.

BREEDING TO INFLUENCE THE OIL CONTENT

Summarizing the results of the ten generations of breeding to influence the oil content in the same manner as we have considered the protein breeding, there are brought together from the detailed records in the appendix the general yearly averages of the high-oil and low-oil plots as arranged in Table 6.

TABLE 6.—TEN GENERATIONS OF BREEDING CORN FOR INCREASE AND DECREASE OF OIL

Year.	High-oil plot, average percent oil.		Low-oil plot, average percent oil.		Difference between crops, percent.
	In seed planted.	In crop harvested.	In seed planted.	In crop harvested.	
1896	....	4.70	....	4.70	.00
1897	5.39	4.73	4.03	4.06	.67
1898	5.20	5.15	3.65	3.99	1.16
1899	6.15	5.64	3.47	3.82	1.82
1900	6.30	6.12	3.33	3.57	2.55
1901	6.77	6.09	2.93	3.43	2.66
1902	6.95	6.41	3.00	3.02	3.39
1903	6.73	6.50	2.62	2.97	3.53
1904	7.16	6.97	2.80	2.89	4.08
1905	7.88	7.29	2.67	2.58	4.71
1906	7.86	7.37	2.20	2.66	4.71

The results show that the response to selection for oil has been even more pronounced and more regular than that for protein as indicated by the total relative increase and decrease and by the changes from year to year.

In the percentages representing the crop produced each year in the high-oil plot there has been with but one exception, namely, in

1901, a constant increase in oil content as the breeding proceeds. Likewise in the low-oil plot there has been a steady decrease from year to year with the single exception of the last year.

We have noted the marked effect which the abundance or scarcity of moisture may have upon the protein content of corn, and in these experiments the oil content appears also to be susceptible to some peculiar seasonal conditions. What these conditions are have not been determined, but that they exist is made apparent if we compare the increase and decrease in the percentage of oil in each generation in the two plots. It would appear as though certain seasons were particularly favorable to the production of oil, while other seasons may be normal or unfavorable in this respect. This effect is particularly apparent in the first two years of the breeding; thus, the season of 1897 seems to have been very unfavorable, while the season of 1898 appears to have been very favorable, to the production of oil.

From the last column in the table which shows, by the differences in percentage between the high-oil and the low-oil crops each year, the real progress accomplished by the breeding, we see that there has been a continuously increasing difference between the percentages of oil in the corn from the two plots up to the tenth year where this difference remains stationary. The high-oil corn has increased from 4.70 percent to 7.37 percent of oil, and the low-oil corn has decreased from 4.70 to 2.66 percent, the difference between the two strains having grown from nothing in 1896 to 4.71 percent in 1905. Curiously enough the oil breeding resembles the protein in the fact that there is constant progress indicated until the tenth year when in each case this progression ceases. In the protein experiments it will be recalled that the figures in this "difference column" show actually a slight regression in the tenth year while here in the oil breeding the differences between the averages of the high-oil and low-oil crop stands exactly stationary in the last two years.

As has already been remarked in the discussion of the protein breeding results, it would be rash to decide at this time from these figures that the limits to which the breeding can be carried are now determined.

Summarizing the results of the ten years' experiments to influence the oil content into one general statement we may say that starting with a single variety of corn and breeding in the two opposite directions, there has been a constantly widening separation between the two strains as the breeding advances until finally after ten generations there have been produced two kinds of corn, one of which is almost three times as rich in oil as the other.

MIXED-OIL PLOT

In order to eliminate any question of the influence of the soil upon the oil content in these experiments, a third plot was planted called the "mixed-oil plot," after the plan of the "mixed-protein plot" already described under that heading. In 1898 there were planted in this plot 50 hills arranged in five rows of ten hills each. In each hill two kernels of high-oil corn were planted on one side and two of low-oil on the opposite side and when the crop was harvested composite samples were made to represent the corn of each side of the row.

This same experiment was repeated in 1899 and also in 1900 the details being given in Tables 100, 101 and 102 of the appendix.

From the results it is to be noticed that never in any of the rows has the percentage of oil in the crop of the low-oil side approached that of the high-oil side. In 1898 the average difference in oil content in the corn resulting from the two kinds of seed was 1.11 percent, in 1899 it was 1.35 percent and in 1900 it was 1.97 percent.

From the mixed-oil plot of 1899 there were taken besides these composite samples 85 pairs of individual ears in which each pair consists of one ear produced from a high-oil seed kernel and one from a low-oil kernel, both ears from plants growing in the same hill. Each of these individual ears was sampled and analyzed and these results are given in Table 103 of the appendix.

The average of all of the individual ears from high-oil seed is 5.22 percent and from low-oil seed it is 3.82 percent. But the point of most interest, perhaps, in connection with this table is the regularity with which the oil content of the crop responds to that of the seed planted, for among the 85 pairs there are only four cases in which the oil in the ear, resulting from low-oil seed happens to surpass in percentage that from the high-oil seed.

The results of these three years' experiments with the mixed-oil plot are all in accordance and they establish beyond dispute the possibility of influencing the oil content of corn by the selection of the seed, showing conclusively that heredity has been responsible for the results obtained quite independent of soil, climatic or cultural conditions.

SECONDARY EFFECTS PRODUCED BY SELECTION TO CHANGE THE COMPOSITION OF THE GRAIN

As is always the case in investigations of this sort, the work had not proceeded far before a multitude of interesting side questions arose, inviting investigation in all directions from the main issue. What secondary effects are produced by this intense selection for these special chemical characteristics? What, for example, is the effect of changing the proportion of protein in the grain upon the other constituents? How is the composition of other parts of the plant affected? What influence has it upon the physical type of the kernel and of the ear? And, what is of especially practical importance, how is the yield affected?

Having established the possibility of influencing the composition of the kernel in this way by several years of breeding and after having actually produced the different kinds of corn to work with, it became possible to take up the study of some of these important secondary effects. The results of the investigation of some of these questions are given in the following pages.

EFFECT ON THE COMPOSITION OF OTHER PARTS OF THE PLANT

After the breeding plots had been under way for five years and marked changes had been produced, a study was begun to ascertain how the composition of other parts of the plant was being affected by altering that of the grain.

Beginning in 1903, there have been collected every year at harvest time representative plants from each of the four "Illinois" breeding plots. These plants were divided in the following manner into three parts, namely, upper-stalk, lower-stalk, and leaves. The leaves were first stripped off from the stalks and these, including the husks, constituted the sample designated here as "leaves." Then at the joint where the ear was borne, the stalk was divided and the part below this point comprised the sample called "lower-stalk," and all above including the tassel, made up the sample designated as "upper-stalk."

It may be observed that the condition of these samples is just as it would be in the ordinary handling of corn stover on the farm. It was cured in the field in the ordinary manner, the stalks having lost some parts of the leaves and tassels. Then this rather arbitrary division into parts follows somewhat in the natural way in which the stover is eaten by animals as fed entire without cutting or shredding. The leaves and husks are entirely consumed and usually a portion at least of the upper stalk is eaten. If any is refused, it is the coarser part of the stalk corresponding somewhat to

our sample of "lower-stalk." With this practical bearing in mind, there is lent something of an added interest to the analyses.

The results of the analyses of these samples are brought together in the tables that follow. For convenient comparison each constituent is considered by itself in a table showing the percentages found in the several parts of the plant in the different strains each season.

In the first two years of the work these samples were taken from every individual breeding row in the four plots so that the results shown here really represent averages of several hundred analyses, but these data form such a mass of material that lack of space forbids presenting them here in detail.

EFFECT ON THE ASH CONTENT

We will consider first the effect produced by the breeding upon the ash content as shown in the following table:

TABLE 7.—ASH CONTENT IN DIFFERENT PARTS OF PLANT

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1902	High-Protein.....	5.25	4.08	8.21	1.57
	Low-Protein	5.82	5.09	8.64	1.45
	High-Oil	5.65	4.89	7.59	1.54
	Low-Oil.....	4.91	3.72	7.11	1.42
1903	High-Protein.....	5.23	4.52	9.66	1.52
	Low-Protein.....	4.86	4.28	7.98	1.34
	High-Oil.....	5.20	3.98	8.23	1.47
	Low-Oil.....	4.75	4.27	7.27	1.47
1904	High-Protein.....	4.38	3.95	6.56	1.60
	Low-Protein.....	5.14	4.57	7.51	1.41
	High-Oil.....	5.05	5.80	7.66	1.56
	Low-Oil.....	5.59	5.53	8.12	1.43
1905	High-Protein.....	4.30	4.02	6.52	1.54
	Low-Protein.....	5.00	4.61	7.47	1.50
	High-Oil.....	5.26	5.92	8.06	1.58
	Low-Oil.....	5.69	5.47	8.34	1.28
1906	High-Protein.....	4.77	4.93	9.08	1.48
	Low-Protein.....	4.28	4.15	8.85	1.41
	High-Oil.....	5.05	5.61	7.72	1.64
	Low-Oil.....	5.67	4.84	7.01	1.46

Comparing the percentages of ash in the high-protein and low-protein strains in the upper-stalk, there is no regularity apparent. In two of the seasons the percentage was greater in the high-protein plot and in the three other seasons it was smaller. The lower-stalk varies in the different seasons in accordance with the

upper-stalk, and, the same is true of the leaves. In the grain the differences are very slight but they show every season a little more ash in the high-protein corn.

Comparing the samples of the various parts from the high-oil and low-oil strains, we find no regularly concordant variations except in the case of the grain where usually the percentage of ash has been a trifle higher in the high-oil than in the low-oil corn. In regard to the distribution of the ash over the plant as a whole we find, as we should expect in accordance with what is generally observed in plant studies of this nature, the lowest proportion of ash in the seed and the highest in the leaves where it amounts sometimes to almost one-tenth of the dry substance.

EFFECT ON THE PROTEIN CONTENT

It is especially interesting to note how the change in the proportion of protein in the grain has affected this constituent in other parts of the plant. For example, does the increase of protein in the kernel mean an increase of this substance in the other organs of the plant, or is this higher content in the kernel the result of an accumulation produced at the expense of other parts?

Table 8 shows the results of the protein determinations in the various parts of the plant.

TABLE 8.—PROTEIN CONTENT IN DIFFERENT PARTS OF PLANT
(Protein derived by multiplying the nitrogen content by the factor 6.25)

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1902	High-Protein.....	3.31	3.28	5.00	12.34
	Low Protein.....	2.90	3.21	4.99	8.22
	High-Oil.....	3.70	4.72	5.13	10.83
	Low-Oil.....	2.78	2.83	4.86	9.31
1903	High-Protein.....	4.00	3.20	4.92	13.04
	Low-Protein.....	3.80	4.26	5.28	8.62
	High-Oil.....	3.20	3.28	5.04	11.04
	Low-Oil.....	3.50	3.58	5.04	10.22
1904	High-Protein.....	6.52	5.68	5.34	15.03
	Low-Protein.....	3.06	3.46	4.77	9.27
	High-Oil.....	4.53	4.08	4.86	12.29
	Low-Oil.....	4.00	4.94	5.10	10.88
1905	High-Protein.....	6.13	6.03	6.46	14.72
	Low-Protein.....	3.59	4.59	5.81	8.57
	High-Oil.....	4.38	6.32	6.42	12.12
	Low-Oil.....	4.41	4.09	5.74	9.86
1906	High-Protein.....	5.99	4.94	5.27	14.26
	Low-Protein.....	5.61	6.48	7.13	8.64
	High-Oil.....	5.38	6.56	5.57	11.81
	Low-Oil.....	4.37	4.37	5.03	10.54

Upon comparing the protein content of the upper-stalk samples we find that the percentage has always been greater in the high-protein plot varying in the different seasons, from only a slight difference to over double the amount.

The lower-stalk follows the upper-stalk in this respect in three of the seasons but in the other two years the protein runs higher in the low-protein strain. The leaves agree quite closely in every case with the lower-stalk.

The wide differences in the protein content of the grain are, of course, the direct result of the selection which have already been considered so that we need not discuss them further in this connection.

Turning now to the oil breeding, there seems to be a lack of any significant regularity in the parts of the stover. In the upper-stalk the percentage of protein runs higher three out of the five seasons in the high-oil strain. In the lower-stalk it is three times out of the five higher in the high-oil strain but corresponding only three times with the upper-stalk. The leaves correspond with the lower-stalk in this comparison.

But a very marked correlation appears in the grain where there has been every year a notable increase in protein in the high-oil strain over that of the low-oil. This is indeed significant and is of such interest that it will be discussed more fully later on.

Regarding the general distribution of the protein in the plant, the data show; that in the other parts, the proportion of protein is never as high as it is in the grain; that among the other parts, the leaves have averaged somewhat higher than the stalks although this condition has not been constant in every year; that, as between the upper and lower portions of the stalk no regular difference can be established.

EFFECT ON THE CRUDE FAT CONTENT. (Ether Extract.)

It will be noticed that the term "crude fat" is used here for designating this determination rather than "oil" as has been used in the rest of this work in which only the kernels were concerned. It should be considered that while in the kernels the substance extracted by ether is practically all oil, in the stalk and leaves it consists to a considerable extent of other constituents besides true fats, or oil, such as coloring matters, waxes, organic acids, etc. On this account these results of the ether extraction are not to be taken as necessarily explicitly expressing the relations of the amount of oil or fat in the various organs of the plant to that of the kernels. However in the chemical analyses of food stuffs, the ether extraction is the best practical method that we have at present of classify-

ing these substances, and in view of the fact that it is usually made and reported in fodder analyses this determination was made in this study with the idea that the information would be of interest and might prove suggestive. The results are given in Table 9.

TABLE 9.—ETHER EXTRACT IN DIFFERENT PARTS OF PLANT

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1902	High-Protein.....	0.98	1.31	1.02	4.85
	Low-Protein.....	0.82	0.95	1.02	4.15
	High-Oil.....	1.08	1.27	0.99	6.41
	Low-Oil.....	0.87	1.21	1.02	3.02
1903	High-Protein.....	0.92	1.42	1.04	4.83
	Low-Protein.....	0.77	0.88	0.90	4.08
	High-Oil.....	0.69	0.86	0.98	6.50
	Low-Oil.....	1.18	0.98	0.98	2.97
1904	High-Protein.....	0.77	1.23	1.16	5.07
	Low-Protein.....	0.78	0.81	1.00	4.17
	High-Oil.....	0.67	0.87	1.10	6.97
	Low-Oil.....	0.69	0.90	0.98	2.89
1905	High-Protein.....	0.95	1.20	1.21	5.04
	Low-Protein.....	0.88	0.95	1.28	3.85
	High-Oil.....	0.82	1.00	1.24	7.29*
	Low-Oil.....	0.72	0.82	1.09	2.58
1906	High-Protein.....	1.02	1.69	1.25	5.28
	Low-Protein.....	1.62	1.89	1.46	3.86
	High-Oil.....	1.07	2.05	1.32	7.37
	Low-Oil.....	1.29	1.46	1.23	2.66

The proportion of ether-extract in the stalks and leaves is not very large ranging mostly around one percent and there are no apparent relations among these results that would indicate any significant influence of the selections either in the protein or in the oil breeding.

In the case of the grain, however, there is an interesting correlation manifested. We have already seen how the protein content of the grain is influenced by the oil selection, and, just as the protein rises and falls with the oil content, so here the oil follows the protein selections, and in every season there is a decided increase of oil in the high-protein strain over that of the low-protein.

The figures show in regard to the relative proportions of ether-extract in the different parts of the plant, that the crude fat in other parts scarcely ever approaches in percentage the oil in the kernel and also that it is generally greater in the lower-stalk and leaves than in the upper-stalk.

EFFECT ON THE PHOSPHORUS CONTENT

On account of their especial bearing upon questions pertaining to soil fertility a knowledge of the phosphorus and potassium contents in these different strains of corn is of interest. Accordingly determinations of these two elements in the samples of the different parts of the plants have been made since 1903. The percentages are given in Tables 10 and 11 being expressed in terms of the elementary substances.

TABLE 10.—PHOSPHORUS CONTENT IN DIFFERENT PARTS OF PLANT

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1903	High-Protein.....	0.19	0.19	0.15	0.36
	Low-Protein.....	0.12	0.10	0.14	0.30
	High-Oil.....	0.10	0.08	0.10	0.34
	Low-Oil.....	0.10	0.09	0.13	0.31
1904	High-Protein.....	0.26	0.24	0.18	0.38
	Low-Protein.....	0.14	0.10	0.12	0.33
	High-Oil.....	0.21	0.12	0.16	0.38
	Low-Oil.....	0.17	0.17	0.18	0.35
1905	High-Protein.....	0.26	0.22	0.18	0.32
	Low-Protein.....	0.12	0.09	0.12	0.30
	High-Oil.....	0.18	0.11	0.12	0.34
	Low-Oil.....	0.17	0.14	0.17	0.25
1906	High-Protein.....	0.28	0.32	0.21	0.34
	Low-Protein.....	0.29	0.21	0.24	0.30
	High-Oil.....	0.25	0.22	0.19	0.35
	Low-Oil.....	0.19	0.14	0.15	0.31

Comparing the high-protein and low-protein strains it is interesting to note that with only the exception of the upper-stalk and leaves in 1906, the phosphorus content is always somewhat higher in the samples representing the high-protein plot both in stover and grain.

In the breeding for high and low-oil, however, such a correlation does not appear in the stover but in the grain we find regularly a higher phosphorus content in the high-oil corn. Taking the plant as a whole the grain is decidedly the richest part in phosphorus thus conforming to what has been generally observed.

EFFECT ON THE POTASSIUM CONTENT

Comparing the high-protein and low-protein plots the different parts of the stover show agreement in three out of the four years in being somewhat richer in potassium in the low-protein strain. The other season all parts were richer in this element, in the high-protein strain.

TABLE II.—POTASSIUM CONTENT IN DIFFERENT PARTS OF PLANT

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1903	High-Protein.....	1.47	1.64	0.90	0.35
	Low-Protein.....	1.52	1.64	0.97	0.32
	High-Oil.....	1.34	1.10	0.76	0.36
	Low-Oil.....	1.33	1.54	1.25	0.36
1904	High-Protein.....	1.07	1.10	1.02	0.37
	Low-Protein.....	1.67	1.67	1.31	0.35
	High-Oil.....	1.63	1.70	1.48	0.39
	Low-Oil.....	1.55	1.74	1.56	0.39
1905	High-Protein.....	1.03	1.07	1.05	0.34
	Low-Protein.....	1.61	1.62	1.35	0.37
	High-Oil.....	1.65	2.36	1.39	0.36
	Low-Oil.....	1.81	2.08	1.60	0.37
1906	High-Protein.....	1.17	1.54	0.88	0.36
	Low-Protein.....	0.89	1.17	0.82	0.40
	High Oil.....	1.59	2.14	1.22	0.39
	Low-Oil.....	1.59	1.79	0.92	0.40

In the grain samples the comparisons show conflicting results but the differences here are so small as to be scarcely significant.

As between the high-oil and low-oil breeding no regularity among the stover samples can be made out. In the grain the percentages are just a trifle greater in the low-oil corn but the differences are too slight to be considered seriously.

These results likewise accord with the usual observance that the stover carries a much larger proportion of potassium than the grain. The stalks and leaves do not vary greatly in this respect.

CONCLUSIONS

The preceding data afford material for numerous other comparisons and a critical study would doubtless reveal many other suggestive facts, but it is our present purpose only to derive as direct an answer as possible to our main question regarding the effect produced upon the composition of the plant as a whole by altering the relative proportions of the constituents of the kernel.

Summarizing the results of this study and putting them into the form of a general statement we may say, that aside from the correlation developed between protein and oil in the grain, there has not been produced any very marked effect. The ash in the grain appears to be influenced very slightly by the protein as well as the oil selection, following these selections in direct correlation. The same is true of the phosphorus content.

Further there is seemingly a tendency toward an increased phosphorus content in the stover resulting from high-protein selection, but this observation needs further confirmation.

CORRELATION BETWEEN PROTEIN AND OIL IN THE KERNEL

At the beginning of the breeding the correlation between the protein and oil content in the kernel was only very slight. The result of the mathematical calculation of this correlation in the original 163 ears from which the first selections were made, as given in Bulletin 87, shows only 3.81 percent of a perfect correlation.

But, although this correlation is insignificant at first, it seems to have advanced with the breeding so that, as we have just observed, after five years it became very prominent both in the protein and in the oil selections.

It is interesting to trace the development of this correlation in the progress of the breeding as may be done in Table 12 in which are given the percentages of oil in the high-protein and low-protein strains each generation excepting the second and third years when these determinations were not made.

TABLE 12.—OIL CONTENT IN HIGH-PROTEIN AND LOW-PROTEIN STRAINS

Average percent oil.			
Year.	High-protein crop.	Low-protein crop.	Difference.
1897	4.52	4.35	0.17
1898	....	....	....
1899	....	....	....
1900	4.75	4.31	0.44
1901	4.82	4.30	0.52
1902	4.85	4.15	0.70
1903	4.83	4.08	0.75
1904	5.07	4.17	0.90
1905	5.04	3.85	1.19
1906	5.28	3.86	1.42

The last column which shows the difference in oil content each year brings out the principle in a most interesting way. This difference between the two plots begins with a very small figure which gradually increases as the breeding goes on corresponding to the differences in the protein itself, until in the tenth generation this difference becomes so significant as to amount to about one-third of the total quantity of oil.

In like manner the behavior of the protein in the high and low-oil strains is shown in Table 13.

TABLE 13.—PROTEIN CONTENT IN HIGH-OIL AND LOW-OIL STRAINS

Average percent protein.			
Year.	High-oil crop.	Low-oil crop.	Difference.
1897	10.76	11.03	- 0.27
1898	.....	.....	....
1899	.....	.....	....
1900	10.83	11.00	-0.17
1901	12.32	10.03	2.29
1902	10.83	9.31	1.52
1903	11.04	10.22	0.82
1904	12.29	10.88	1.41
1905	12.12	9.86	2.26
1906	11.81	10.54	1.27

Although the differences in protein content in the high-oil and low-oil plots have not been as regular or constant as in the case of the oil content in the high-protein and low-protein plots, yet the same principle is evident, for, whereas in the earlier years the protein actually averages a little higher in the low-oil strain as indicated in the table by the minus signs, in later generations after the breeding had advanced and greater differences in the oil content had been induced, the correlation appears and remains, although fluctuating in intensity from year to year.

EFFECT ON THE TYPE OF KERNEL

That the selection for certain chemical constituents has a very noticeable effect upon the physical characteristics of the kernel was observed very early in the work and in Bulletin 55 descriptions with photographs were published showing the possibility of distinguishing between high-protein and low-protein corn as well as between high-oil and low-oil corn by the mechanical structure of the kernel. The matter has been mentioned again in Bulletins 82 and 100, and Bulletin 87, "The Structure of the Corn Kernel and the Composition of its Different Parts," deals especially with this phase of the subject, treating it in considerable detail. Therefore it is not proposed to discuss this matter at length here, but only to call attention briefly to the facts observed in this connection.

Selection for high-protein has developed a type of kernel having a relatively larger proportion of that part characterized by its horny structure, the soft starchy part which immediately surrounds the germ and runs up into the crown of the kernel being less prominent. In the type of kernel resulting from low-protein selection

this condition is reversed and here the soft starchy part predominates. Viewed externally the high-protein kernel has a somewhat glassy appearance while the low-protein presents a milky effect.

Following the fact that about four-fifths of all the oil in the kernel resides within the germ, the selection for high-oil has resulted in a kernel having a relatively large proportion of germ, while the low-oil selection has produced a kernel whose germ occupies a relatively small proportion of the space.

It should be borne in mind that a reduction of the proportion of germ does not necessarily depend altogether upon a decrease in the absolute size, for the same effect would be produced by increasing the size of the endosperm, and in our low-oil strain this is what has really taken place to some extent, so that the selection has resulted in a large broad type of kernel admitting fewer rows on the cob.

The question is often asked as to whether there is any difference apparent in germination on account of this effect upon the size of the germ. In laboratory tests under carefully controlled and comparable conditions a difference in the rate and vigor with which the germination starts off has been observed, the first signs of growth appearing about twenty-four hours earlier in the high-oil corn. This difference, however, becomes less apparent as the development of the young plantlet proceeds and in the field there is as yet no detrimental effect noticeable due to impaired vitality in the seed brought about by the selection for low-oil.

EFFECT ON THE TYPE OF EAR

That the selection in these different directions has likewise had its effect upon the physical characteristics of the ear is clearly shown in Bulletin 119, "Type and Variability in Corn," in which Dean Davenport and Doctor Rietz have made this matter the subject of a special study.

In this investigation ears from each of the four "Illinois" strains from the crops of the ninth and tenth generations were subjected to measurements of their length, circumference, weight, and number of rows of kernels.

The variability of each one of these characteristics was studied by the statistical method in which are determined mathematical expressions showing the "mean," or average value of the character in question, as well as its tendency to vary from this average, expressed by the "standard deviation" and the "coefficient of variability." Taking from these tabulated results those figures which are of especial concern in this connection, the following interesting facts are brought out.

Selection for high-protein has produced an ear averaging somewhat smaller than the low-protein ear as shown by a comparison of the length, circumference and weight; the number of rows of kernels also averages slightly less on the typical high-protein ear.

Similarly the high-oil selection has resulted in a smaller type of ear than has the low-oil, the length, circumference and weight being less in each case in the high-oil strain. However, in spite of the fact that the typical low-oil ear is the largest of any of the strains, the number of rows of kernels is the least, this being due to the broadening of the kernel as previously explained.

EFFECT ON THE YIELD

One of the first questions to be taken into consideration from the practical standpoint is, of course, the effect that selection for these various characteristics has upon the productiveness.

In this connection it should be borne in mind that during the earlier years of these experiments in the selection of seed no special precaution was taken against in-breeding. If the pedigree lines be traced back in the high-protein plot it will be found that they all converge in a single ear grown in 1901. The low-protein strain as it now exists is the progeny of two of the original ears and the same is true of the low-oil. The high-oil strain traces back to three original ears. Thus the pedigree records show that there must have been a considerable amount of rather close in-breeding which has probably exerted a more or less detrimental effect upon the yield. It was not until the ninth generation that we started our present system of taking seed from detasseled rows only and arranging the planting of the seed ears with reference to their relationship, in order to prevent as far as possible such close in-breeding.

Neither was there in the earlier years of the breeding any selection based upon productiveness other than the choice of the largest, finest seed ears. In the sixth generation a system of rejecting a few of the lowest yielding rows was begun but it was not until the ninth generation that our present system was adopted of selecting one-half of the detasseled rows according to their performance as regards productiveness.

Therefore in speaking of the yielding propensities of these several strains of corn, these handicaps which they have undergone in the breeding should be taken into consideration.

In order to test this matter of yield, seed has been taken every year since the sixth generation from each of the four breeding plots and planted in our variety test plots where they are given conditions of soil and culture as uniform as possible for securing comparable results.

In this variety test there are planted at certain intervals so-called "Standard plots" from one of the best standard varieties of this region the purpose of these being to serve as a check for comparison in different parts of the field. In Table 14 the yield each year in terms of bushels of shelled corn per acre is given for each of the four "Illinois" strains along with that of the standard variety.

TABLE 14.—YIELDS OF "ILLINOIS" STRAINS IN VARIETY TEST PLOTS

Year.	High-protein strain.	Low-protein strain.	High-oil strain.	Low-oil strain.	Standard variety.
1903	27.3	37.7	32.7	41.3	40.9 (Boone Co. White)
1904	32.1	55.5	41.9	40.5	53.7 (" " ")
1905	56.6	60.7	58.4	58.1	68.4 (Silvermine)
1906	65.1	73.2	66.3	83.2	{ 75.7 (") 87.9 (Leaming)

In looking over these results there are some irregularities to be seen and it is still too early to draw final conclusions in all respects. The maximum yield varies among the four strains in the different years. In two of the seasons the low-oil gave the highest yield and in two others the low-protein yielded most.

But the lowest yield has in every season been produced by the high-protein corn and this fact accords with our previous observation regarding the type of ear where we found the typical high-protein ear to be the smallest of all the four strains. So it seems a high-protein content and the highest productivity do not go together.

The formation of protein depends, of course, upon the supply of nitrogen in the soil. In fact the relation is so intimate that it has been observed in experiments that the protein content can be increased in corn by the application of nitrogenous fertilizers. This suggests the possibility of a limitation of growth on ordinary soil due to an extra high nitrogen requirement on the part of the high-protein strain.

If, however, we consider the production of *protein per acre* we will find a very decided gain in the production of protein in the high-protein breeding. For example in 1906 the high-protein strain produced 65.1 bushels per acre and the protein content of the crop that year as we have seen was 14.26 percent. This would yield (reckoning 56 pounds shelled corn per bushel) 520 pounds of

protein per acre. At the same time the low-protein strain produced 73.2 bushels carrying 8.54 percent of protein which would yield 354 pounds. This makes a difference of 166 pounds of protein per acre in favor of the high-protein breeding. This, however, from the practical standpoint, would be an unfair comparison because ordinarily what the farmer has to deal with is corn of ordinary protein content rather than low-protein corn. We have no "Illinois" strain now unaffected by chemical selection with which to make the comparison. But suppose we compare our "Illinois High-Protein" with the standard white variety for this year, that is the "Silvermine," which has had no chemical selection, and assume that it contains the same percentage with which we started the "Illinois" breeding, that is 10.92, which as a matter of fact is not far from the average of ordinary dent corn. Making the computation we find that the 75.7 bushel yield containing 10.92 percent would give us 463 pounds of protein per acre. Based upon this estimate there was a gain this year of 57 pounds of protein per acre by the high-protein breeding and this is of no mean consequence when we consider that this 57 pounds represents about one-eighth of the total quantity of protein produced.

On the whole these results of the yields are quite gratifying when we consider that these "Illinois" strains have maintained their productiveness as well as they have in spite of the intense selection they have undergone for other special characteristics. With the exception of one season, some one of the Illinois strains has even surpassed in yield the supposedly good variety used as a standard. All of this goes to show that intense selection for a special character is not necessarily accompanied by a reduction in yield, this not implying, of course, that selection for yield alone would not make greater progress when unhampered by consideration for other characteristics.

APPENDIX

In connection with this investigation a large amount of experimental data has been collected. For the selection of seed for these four "Illinois" breeding plots there have been analyzed during the ten years 4990 individual ears. Of these, 756 ears have been selected and subjected to performance test in the breeding plots and the records of these tests form a most interesting and instructive series. The importance of placing these data on record by publication rests not alone upon their direct connection with the subject matter in hand. There are many obscure problems in this work of corn breeding of intensely practical significance upon which we may hope to secure light by a study of such heredity records as these, and in the study of the broader problems relating to the general subject of heredity there has been a lack of just such specific statistical data as these analyses afford. Already they have furnished excellent material for some such studies and naturally their value as such will ever increase with their accumulation. Therefore it seems advisable to present the essential detailed data of these experiments, preferably incorporated in systematic arrangement in an appendix where they may be referred to at pleasure, rather than encumbering the text of the bulletin with such a mass of statistical material.

The following tables are so arranged in series that the complete history of each strain of the breeding is shown by itself. For each year there is given a record of the breeding plot in a table showing the analyses of the seed ears planted and of the corresponding crops harvested. Immediately following this table is a second one in which are listed the analyses of all of the ears examined from that breeding plot for the selection of seed ears to be planted in the succeeding year's plot.

By this arrangement it is made possible with the system of "Register Numbers" and "Dam Numbers" previously explained, to readily find the relationships of all the ears ever produced in each of the four strains.

The first table gives the complete analyses of the 163 original ears from which the four strains of corn were started and a column is added to indicate to which of the breeding plots each of the selected ears is assigned. Following this table are given the series of records for the high-protein plot, low-protein plot, high-oil plot and low-oil plot in the order named.

The "Annual Ear No." in these records correspond to the "Corn No." as used in Bulletin 55 and, as previously explained, this is simply a temporary number used while working with the corn for the selection and has no permanent significance, there is no necessity for changing the back records in this respect and so these old numbers are retained. They begin in the first table with No. 76 and run in the order of the rows of the breeding plot, that is in the order of their mother ears or "Dam Numbers."

In the first year usually four ears were analyzed from each plot-row and every fifth number was given to the composite sample representing the row as will be seen in the tables of 1897. In the years following, up to 1903, nine ears were analyzed from each plot-row and every tenth number was given to the corresponding composite sample. In 1903 the new system was adopted in which the "Annual Ear Number" begins with 1 each year and ten ears are analyzed from each selected plot-row with no provision for composite sample numbers within the series. In 1905 another modification was introduced in which 20 ears instead of 10 are analyzed from each selected plot-row.

In the tables of analyses all ears that have been selected for seed are indicated by their assigned "Register Nos." being placed in the column opposite.

In order to illustrate the working of this system of records let us suppose that it be desired to trace the pedigree record of a given ear. We may take as an example the first ear analyzed from the high-protein plot in 1906 and registered as No. 1102. We see immediately that the "dam" or mother of this ear was No. 1004. By reference to the plot record of the year 1906 we find that the ear with Register No. 1004 had a protein content of 17.39 percent and that its "dam" was No. 914. Turning now to the plot record of the previous year we find that Register No. 914 had 17.73 percent of protein and by the corresponding "Dam No." we are referred to No. 811 of the preceding generation. Following along in this manner through the preceding generations we finally trace the complete maternal pedigree back to the beginning of the breeding. Thus we find the pedigree record with respect to the protein content of this ear registered as No. 1102 to run as follows:

Maternal pedigree record.	Year planted.	Protein, percent.
Register No. 1102.....	1907	17.13
By Dam No. 1004.....	1906	17.39
" " " 914.....	1905	17.73
" " " 811.....	1904	17.33
" " " 710.....	1903	14.70
" " " 601.....	1902	15.00
" " " 507.....	1901	15.71
" " " 413.....	1900	14.53
" " " 323.....	1899	12.45
" " " 207.....	1898	12.46
" " " 121.....	1897	12.28

At the end of these four series of the regular plots are Tables 96 to 103 inclusive which contain the records of the mixed-protein and mixed-oil plots.

TABLE 15.—COMPOSITION OF ONE HUNDRED SIXTY-THREE INDIVIDUAL EARS FROM GENERAL CROP OF 1896

Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No. assigned.
76	1.70	10.05	4.77	83.48	High-oil	107
77	1.45	10.42	5.24	82.89		
78	1.55	11.00	4.90	82.55		
79	1.62	10.89	4.88	82.61		
80	1.63	11.50	4.58	82.29		
81	1.47	11.49	4.26	82.78	Low-protein High-protein	103
82	1.39	11.78	4.83	82.00		
83	1.17	9.08	4.05	85.70		
84	1.51	12.79	4.25	81.45		
85	1.46	11.76	4.94	81.84		
86	1.50	12.07	4.61	81.82	High-protein High-protein	102
87	1.59	12.40	4.74	81.27		
88	1.35	9.34	4.84	84.47		
89	1.61	10.71	4.70	82.98		
90	1.55	9.90	4.97	83.58		
91	1.56	10.68	4.91	82.85	High-protein	113
92	1.46	12.96	3.97	81.61		
93	1.48	11.80	4.80	81.92		
94	1.74	11.89	4.55	81.82		
95	1.55	10.49	5.51	82.45		
96	1.60	11.10	4.38	82.92	High-oil Low-protein High-protein	109
97	1.59	11.84	4.96	81.61		
98	1.39	10.23	5.51	82.87		
99	1.42	8.40	4.91	85.27		
100	1.65	12.28	4.76	81.31		
101	1.30	10.08	4.86	83.76	High-protein High-oil	119
102	1.49	11.83	4.51	82.17		
103	1.44	11.25	4.78	82.53		
104	1.54	11.82	4.43	82.21		
105	1.37	12.36	4.84	81.43		
106	1.33	11.15	5.21	82.31	High-oil High-protein	120
107	1.33	9.47	4.97	84.23		
108	1.30	11.04	4.67	82.99		
109	1.45	10.82	5.65	82.08		
110	1.60	12.81	5.21	80.38		
111	1.31	10.76	4.13	83.80	Low-protein Low-protein	111
112	1.26	10.48	4.54	83.72		
113	1.10	9.30	4.38	85.22		
114	1.33	9.12	4.10	85.45		
115	1.29	10.41	4.17	84.13		
116	1.10	8.38	4.88	85.64	Low-protein High-oil High-protein	105
117	1.42	9.95	4.23	84.40		
118	1.44	11.40	5.02	82.14		
119	1.55	12.38	4.62	81.45		
120	1.39	9.97	4.42	84.22		
121	1.36	10.09	4.82	83.73	High-oil Low-oil	117
122	1.36	10.31	5.25	83.08		
123	1.34	9.68	4.01	84.97		
124	1.44	11.87	4.61	82.08		
125	1.34	10.73	4.53	83.40		
126	1.49	13.87	5.72	78.92	High-protein	112
127	1.43	11.53	4.31	82.73		
128	1.33	11.64	4.57	82.46		
129	1.36	11.25	4.16	83.23		

TABLE 15.—*Continued*

Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No., assigned.
130	1.35	11.86	5.01	81.78		
131	1.47	10.49	4.86	83 18		
132	1.55	11.13	4.55	82.77		
133	1.39	11.13	4.10	83 38	Low-oil	110
134	1.30	10.85	4.45	83.40		
135	1.37	11.29	4.53	82.81		
136	1.59	11.43	5.10	81.88	High-oil	103
137	1 47	11.61	4 41	82.51		
138	1.36	11.36	4.53	82.75		
139	1.57	9.81	5.23	83.39	High-oil	118
140	1.34	10 53	4.18	83.95		
141	1 45	12.42	4.51	81.62	High-protein	120
142	1.37	9.31	4.82	84.50		
143	1.29	11.33	4.49	82.89		
144	1.42	11.39	4.99	82.20	High-oil	124
145	1.45	8.25	4.81	85.49	Low-protein	106
146	1.47	11.29	4.83	82.41		
147	1.26	12.21	4.49	82.04	High-protein	123
148	1 54	11.94	4.74	81.78		
149	1.36	11.29	4.08	83.27	Low-oil	101
150	1.44	11.71	4.03	82.82	Low-oil	103
151	1.40	9.31	4.96	84.33	Low-protein	101
152	1.41	11.90	4.09	82 60	Low-oil	102
153	1.35	12.51	5.19	80.95	High-protein	108
154	1.42	11 13	5.02	82.43	High-oil	123
155	1.44	11.05	4.53	82.98		
156	1.39	11.74	4.14	82.73	Low-oil	112
157	1.46	10.02	4.88	83.64		
158	1 45	10.66	4.51	83.38		
159	1.48	11.53	4.65	82.34		
160	1.43	11.50	4.83	82.24		
161	1.47	11.11	4.93	82.49		
162	1.48	12.09	5.61	80.82	High-oil	114
163	1.29	10.78	5.09	82.84	High-oil	102
164	1 30	9.36	4.34	85.00	Low-protein	110
165	1.47	10 50	4.75	83.28		
166	1.65	11.29	3.84	83.22	Low-oil	106
167	1.37	9.58	4.72	84.33		
168	1.49	10.94	4.34	83.23		
169	1.60	11 79	4.22	82.39		
170	1.36	11.06	4.39	83.19		
171	1.44	11.18	5.75	81.63	High-oil	113
172	1.45	12.28	3.99	82.28	High-protein	121
173	1.39	10.14	4.35	84.12		
174	1.30	10.19	5.22	83.29	High-oil	106
175	1.40	12 68	5.29	80.63	High-protein	109
176	1.37	9.86	4.73	84 04		
177	1.48	13.06	4.93	80.53	High-protein	114
178	1.37	10 93	4.76	82.94		
179	1.32	11.87	5.03	81.78		
180	1.39	11.27	4.55	82 79		
181	1.47	9.66	4.21	84.66		
182	1.37	10.97	3.94	83.72	Low-oil	107
183	1.54	10.32	5.46	82.68	High-oil	108
184	1.44	10.68	4.89	82.99		

TABLE 15.—Continued

Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No. assigned.
185	1.42	9.33	4.49	84.76	Low-protein	109
186	1.48	10.78	4.74	83.00		
187	1.28	10.49	4.44	83.79		
188	1.53	13.10	5.51	79.86	High-protein	115
189	1.32	9.58	5.63	83.47	High-oil	110
190	1.25	11.50	4.95	82.30		
191	1.29	11.19	4.31	83.21		
192	1.51	11.49	4.07	82.93	Low-oil	104
193	1.36	9.47	4.51	84.66	Low-protein	112
194	1.50	11.47	4.65	82.38		
195	1.54	11.09	4.37	83.00		
196	1.30	9.44	3.95	85.31	Low-oil	105
197	1.26	11.20	4.46	83.08		
198	1.44	10.23	4.53	83.80		
199	1.29	10.64	4.67	83.40		
200	1.39	10.13	4.84	83.64		
201	1.38	9.64	5.22	83.76	High-oil	105
202	1.39	11.26	4.96	82.39		
203	1.26	10.48	4.59	83.67		
204	1.66	12.57	4.82	80.95	High-protein	118
205	1.46	10.71	5.36	82.47	High-oil	116
206	1.34	10.27	4.65	83.74		
207	1.25	11.09	4.27	83.39		
208	1.48	12.05	4.78	81.69	High-protein	124
209	1.48	10.22	4.30	84.00		
210	1.45	11.16	4.75	82.64		
211	1.48	10.44	4.21	83.87		
212	1.27	9.75	4.12	84.86	Low-oil	111
213	1.53	12.40	4.75	81.32	High-protein	104
214	1.58	10.22	4.43	83.77		
215	1.45	9.22	4.60	84.73	Low-protein	108
216	1.42	10.27	4.35	83.96		
217	1.32	9.39	4.83	84.46		
218	1.40	9.74	4.71	84.15		
219	1.37	9.92	4.32	84.39		
220	1.43	9.63	5.23	83.71	High-oil	104
221	1.32	10.33	5.01	83.34		
222	1.41	12.34	4.57	81.68	High-protein	122
223	1.49	10.58	4.64	83.29		
224	1.52	11.36	4.63	82.49		
225	1.33	9.15	4.55	84.97	Low-protein	104
226	1.36	10.31	5.08	83.25		
227	1.46	12.63	5.15	80.76	High-protein	107
228	1.41	12.16	4.12	82.31	Low-oil	109
229	1.36	11.04	4.52	83.08		
230	1.43	12.10	4.29	82.18	High-protein	103
231	1.33	10.95	4.60	83.12		
232	1.52	12.76	4.10	81.62	High-protein	116
233	1.40	9.75	4.14	84.71		
234	1.39	10.78	4.76	83.07		
235	1.58	9.97	5.27	83.18	High-oil	119
236	1.40	10.18	6.02	82.40	High-oil	112
237	1.47	11.16	5.13	82.24	High-oil	122
238	1.60	11.42	5.20	81.78	High-oil	121

TABLE 16.—FIRST GENERATION HIGH PROTEIN PLOT RECORD, 1897

Register ear No.	†By Dam No.	Protein, percent.		Register ear No.	†By Dam No.	Protein, percent.	
		Seed ear planted.	Crophar-vested			Seed ear planted.	Crophar-vested.
101		11.89	9.61	*114		13.06	{ 10 89
102		12.07	11.07				{ 10 67
103		12.10	10.94	*115		13.10	{ 10.34
104		12.40	11.48				{ 11.48
105		12.28	10.85	116		12.76	11.05
106		12.38	11.64	117		12 40	10.75
107		12.63	11.46	118		12.57	10.86
108		12.51	11.57	119		12.36	11.07
109		12.68	11.17	120		12.42	10.88
110		12.79	11.14	121		12.28	11.73
111		12.81	11.16	122		12.34	10.76
*112		13.87	{ 11.60	123		12.21	11 30
	{ 11.31		124		12.05	11.53	
*113		12.96	{ 11.07				
	{ 11.44						
Average of plot						12.54	11.10

*Crop from Reg. Nos. 112, 113, 114, and 115 sampled in duplicate.

†First generation not known.

TABLE 17.—PROTEIN IN ONE HUNDRED TWELVE INDIVIDUAL EARS FROM HIGH-
PROTEIN PLOT OF 1897

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 101</i>			<i>By Dam 111</i>			<i>By Dam 117</i>		
271	8.82		321	11.43		371	11.75	
272	8.42		322	10.94		372	9.46	
273	11.60		323	11.18		373	11.17	
274	8.34		324	11.55		374	8.67	
<i>By Dam 102</i>			<i>By Dam 112</i>			<i>By Dam 118</i>		
276	12.83	215	326	13.62	212	376	10.47	
277	10.46		327	10.99		377	10.92	
278	9.95		328	11.07		378	9.32	
279	10.96		329	9.18		379	12.28	218
<i>By Dam 103</i>			<i>* By Dam 112</i>			<i>By Dam 119</i>		
281	12.62	208	331	11.40		381	9.31	
282	10.43		332	12.24	205	382	11.00	
283	9.87		333	10.06		383	12.23	221
284	11.58		334	11.02		384	11.99	201
<i>By Dam 104</i>			<i>By Dam 113</i>			<i>By Dam 120</i>		
286	10.97		336	10.78		386	12.10	203
287	11.08		337	11.28		387	9.20	
288	10.23		338	11.09		388	9.76	
289	12.99	214	339	12.85	210	389	9.18	
<i>By Dam 105</i>			<i>* By Dam 113</i>			<i>By Dam 121</i>		
291	11.52		341	11.65		391	12.46	207
292	10.44		342	11.35		392	11.14	
293	11.92		343	10.60		393	10.03	
294	11.25		344	12.16	220	394	13.27	211
<i>By Dam 106</i>			<i>By Dam 114</i>			<i>By Dam 122</i>		
296	11.11		346	11.63		396	9.94	
297	12.07	222	347	12.26	204	397	11.78	
298	13.58	213	348	8.76		398	11.30	
299	11.68		349	10.69		299	11.08	
<i>By Dam 107</i>			<i>* By Dam 114</i>			<i>By Dam 123</i>		
301	10.80		351	11.39		401	11.23	
302	12.26	219	352	10.59		402	10.92	
303	11.20		353	9.65		403	9.72	
304	11.97	223	354	9.83		404	11.14	
<i>By Dam 108</i>			<i>By Dam 115</i>			<i>By Dam 124</i>		
306	12.33	206	356	8.63		406	10.44	
307	12.39	217	357	11.08		407	12.72	216
308	9.64		358	11.39		408	12.80	209
309	9.93		359	9.12		409	11.17	
<i>By Dam 109</i>			<i>* By Dam 115</i>					
311	10.65		361	11.63				
312	11.05		362	9.98				
313	9.89		363	10.45				
314	10.22		364	11.89	224			
<i>By Dam 110</i>			<i>By Dam 116</i>					
316	11.08		366	12.01	202			
317	10.29		367	9.51				
318	11.72		368	11.43				
319	8.76		369	11.76				

*An extra set of ears were analyzed from Dams 112, 113, 114 and 115.

TABLE 18.—SECOND GENERATION HIGH PROTEIN PLOT RECORD, 1898

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crop harvested.			Seed ear planted.	Crop harvested.
201	119	11.99	11.18				
202	116	12.01	10.86	*213	106	13.58	{ 11.74
203	120	12.10	10.64				{ 11.42
204	114	12.26	11.26	*214	104	12.99	{ 11.42
205	112	12.24	11.61				{ 11.20
206	108	12.33	11.24	215	102	12.83	11.34
207	121	12.46	11.26	216	124	12.72	10.77
208	103	12.62	10.80	217	108	12.39	11.03
209	124	12.80	10.55	218	118	12.28	10.96
210	113	12.85	10.92	219	107	12.26	10.47
				220	113	12.16	10.33
				221	119	12.23	11.58
*211	121	13.27	{ 11.06	222	106	12.07	9.78
			{ 10.67				
				223	107	11.97	10.72
*212	112	13.62	{ 11.17	224	115	11.89	10.95
			{ 12.48				
Average of plot						12.49	11.05

*Crop from Reg. Nos. 211, 212, 213, and 214 were sampled in duplicate.

TABLE 19.—PROTEIN IN TWO HUNDRED FIFTY-TWO INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1898

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 201			By Dam 206			By Dam 211		
821	9.82	305	871	12.82	321	921	11.29	
822	10.38		872	11.65		922	9.69	
823	10.46		873	10.21		923	9.78	
824	11.08		874	10.13		924	10.18	
825	10.79		875	10.49		925	11.54	
826	12.83		876	10.58		926	11.93	
827	12.50		877	11.20		927	12.29	
828	7.84		878	10.61		928	11.39	
829	12.07		879	12.01		929	10.98	
By Dam 202			By Dam 207			*By Dam 211		
831	10.19		881	10.76	323	931	11.98	
832	9.66		882	11.38		932	11.05	
833	9.97		883	11.22		933	10.04	
834	11.92		884	9.60		934	9.84	
835	11.47		885	12.45		935	9.96	
836	10.76		886	13.67		936	11.01	
837	12.04		887	9.90		937	11.22	
838	11.58		888	11.08		938	11.09	
839	9.39		889	11.59		939	8.76	
By Dam 203			By Dam 208			By Dam 212		
841	11.17	308	891	10.40	314	941	9.84	312
842	10.88		892	12.09		942	10.84	
843	10.39		893	9.98		943	11.69	
844	10.91		894	9.06		944	8.75	
845	13.05		895	13.46		945	14.92	
846	7.72		896	10.54		946	11.36	
847	9.48		897	9.93		947	13.04	
848	8.92		898	9.28		948	10.12	
849	9.63		899	11.64		949	8.89	
By Dam 204			By Dam 209			*By Dam 212		
851	12.48	303	901	9.90	322	951	14.25	313
852	10.31		902	10.33		952	9.83	
853	12.03		903	11.48		953	13.21	
854	11.78		904	12.55		954	12.91	
855	11.22		905	8.89		955	10.37	
856	10.60		906	11.95		956	11.50	
857	11.27		907	10.84		957	10.69	
858	9.81		908	9.15		958	11.94	
859	9.69		909	10.02		959	14.05	
By Dam 205			By Dam 210			By Dam 213		
861	11.18	317	911	11.66		961	12.97	306
862	12.10		912	11.06		962	13.25	
863	11.55		913	10.02		963	12.66	
864	13.04		914	10.08		964	11.68	
865	11.08		915	11.83		965	9.29	
866	11.73		916	11.09		966	9.89	
867	11.48		917	11.45		967	12.12	
868	11.78		918	10.75		968	12.29	
869	10.64		919	9.67		969	9.71	

TABLE 19.—Continued.

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	
*By Dam 213			By Dam 217			By Dam 222			
971	10.55	319	1021	10.06		1071	8.07		
972	11.80		1022	12.24		1072	11.48		
973	9.47		1023	10.25		1073	10.95		
974	11.97		1024	11.84		1074	10.47		
975	11.94		1025	11.50		1075	10.90		
976	12.98		1026	11.23		1076	10.17		
977	10.96		1027	9.66		1077	10.84		
978	11.43		1028	11.91		1078	7.83		
979	12.16		1029	9.86		1079	9.06		
By Dam 214			By Dam 218			By Dam 223			
981	11.80	316 310	1031	11.74		1081	11.44		
982	11.58		1032	11.53		1082	9.97		
983	10.12		1033	10.15		1083	11.55		
984	13.12		1034	8.90		1084	9.94		
985	13.34		1035	9.93		1085	11.27		
986	10.95		1036	10.46		1086	11.57		
987	11.38		1037	10.47		1087	10.53		
988	11.17		1038	11.72		1088	9.36		
989	10.11		1039	12.39		302	1089		10.61
*By Dam 214			By Dam 219			By Dam 224			
991	11.39		1041	8.70	301	1091	8.74	304	
992	9.86		1042	10.98		1092	9.50		
993	10.69		1043	8.63		1093	10.20		
994	10.75		1044	12.16		1094	10.60		
995	12.42		1045	12.35		1095	11.49		
996	10.42		1046	10.10		1096	12.74		
997	11.72		1047	9.54		1097	10.47		
998	12.20		1048	10.83		1098	12.07		
999	10.96		1049	10.68		1099	12.36		
By Dam 215			By Dam 220						
1001	11.85	320	1051	10.87	324				
1002	11.42		1052	9.63					
1003	10.39		1053	8.61					
1004	12.88		1054	10.31					
1005	9.32		1055	12.37					
1006	11.04		1056	10.28					
1007	12.75		1057	11.85					
1008	10.33		1058	11.26					
1009	12.69		1059	9.80					
By Dam 216			By Dam 221						
1011	12.99	318	1061	12.78	307				
1012	9.96		1062	13.03					
1013	9.71		1063	11.72					
1014	10.78		1064	10.58					
1015	11.51		1065	10.95					
1016	11.39		1066	11.50					
1017	9.81		1067	12.04					
1018	9.11		1068	11.43					
1019	11.29		1069	11.42					

*An extra set of ears were analyzed from Dams 211, 212, 213 and 214.

TABLE 21.—PROTEIN IN TWO HUNDRED SIXTEEN INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1899

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 301</i>			<i>By Dam 306</i>			<i>By Dam 311</i>		
1601	12.03		1651	12.10		1701	13.46	420
1602	9.81		1652	11.85		1702	13.74	407
1603	10.79		1653	10.75		1703	12.10	
1604	7.71		1654	9.54		1704	14.41	411
1605	11.28		1655	11.73		1705	12.09	
1606	11.56		1656	13.22	401	1706	11.70	
1607	10.18		1657	11.57		1707	12.78	
1608	8.91		1658	9.66		1708	11.01	
1609	9.66		1659	13.36	405	1709	12.75	
<i>By Dam 302</i>			<i>By Dam 307</i>			<i>By Dam 312</i>		
1611	9.91		1661	13.41	403	1711	12.37	
1612	8.35		1662	12.75		1712	12.83	
1613	9.11		1663	11.72		1713	10.17	
1614	9.83		1664	11.46		1714	12.69	
1615	11.20		1665	12.32		1715	10.32	
1616	11.88		1666	11.58		1716	11.41	
1617	10.96		1667	13.09		1717	12.06	
1618	10.75		1668	12.77		1718	11.35	
1619	9.77		1669	11.48		1719	10.59	
<i>By Dam 303</i>			<i>By Dam 308</i>			<i>By Dam 313</i>		
1621	11.69		1671	11.32		1721	13.05	
1622	11.60		1672	11.11		1722	9.94	
1623	9.94		1673	12.30		1723	10.23	
1624	13.13		1674	9.81		1724	11.97	
1625	10.60		1675	10.02		1725	12.25	
1626	12.15		1676	10.27		1726	10.32	
1627	12.32		1677	10.92		1727	10.06	
1628	12.65		1678	10.52		1728	9.91	
1629	11.82		1679	9.55		1729	11.21	
<i>By Dam 304</i>			<i>By Dam 309</i>			<i>By Dam 314</i>		
1631	10.25		1681	10.59		1731	11.95	
1632	12.83		1682	12.33		1732	13.19	424
1633	13.54		1683	13.48	404	1733	13.94	409
1634	11.55		1684	12.88		1734	11.05	
1635	11.10		1685	11.00		1735	10.47	
1636	11.87		1686	13.87	408	1736	10.10	
1637	9.78		1687	13.31	402	1737	12.34	
1638	10.30		1688	10.29		1738	13.20	
1639	10.24		1689	12.09		1739	10.02	
<i>By Dam 305</i>			<i>By Dam 310</i>			<i>By Dam 315</i>		
1641	11.04		1691	11.90		1741	10.13	
1642	12.13		1692	11.35		1742	10.50	
1643	10.50		1693	12.97		1743	11.41	
1644	11.15		1694	10.07		1744	8.74	
1645	9.97		1695	12.21		1745	11.96	
1646	11.31		1696	12.53		1746	13.73	418
1647	10.81		1697	11.93		1747	11.76	
1648	11.55		1698	11.37		1748	10.16	
1649	10.66		1699	10.56		1749	11.20	

TABLE 23.—PROTEIN IN TWO HUNDRED SIXTEEN INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1900

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 401			By Dam 406			By Dam 411		
2801	12.22	514	2851	12.55	510	2901	12.31	506
2802	13.09		2852	12.28		2902	15.21	
2803	14.35		2853	11.14		2903	12.72	
2804	12.05		2854	13.30		2904	12.93	
2805	12.57		2855	10.56		2905	12.45	513
2806	11.20		2856	12.82		2906	14.43	
2807	12.31		2857	12.15		2907	12.43	
2808	12.54		2858	13.34		2908	12.72	
2809	11.87		2859	11.61		2909	13.45	
By Dam 402			By Dam 407			By Dam 412		
2811	14.10	515	2861	11.44	510	2911	14.54	503
2812	14.01		2862	13.31		2912	13.31	
2813	12.34		2863	14.63		2913	11.31	509
2814	12.45		2864	13.53		2914	12.64	
2815	11.99		2865	13.11		2915	13.71	
2816	14.06		2866	11.75		2916	12.56	
2817	11.93		2867	12.99		2917	11.79	
2818	13.13		2868	13.43		2918	12.87	
2819	13.30		2869	13.63		2919	15.20	
By Dam 403			By Dam 408			By Dam 413		
2821	11.82	511	2871	13.63	502	2921	12.47	505
2822	14.09		2872	13.11		2922	14.98	
2823	13.32		2873	10.59		2923	14.45	512
2824	13.72		2874	12.55		2924	14.38	501
2825	14.56		2875	12.19		2925	13.22	508
2826	11.30		2876	10.88		2926	15.40	
2827	13.55		2877	12.57		2927	15.71	
2828	11.64		2878	12.13		2028	12.48	507
2829	12.48		2879	13.90		2929	13.58	
By Dam 404			By Dam 409			By Dam 414		
2831	11.45	511	2881	11.26	502	2931	14.17	509
2832	11.86		2882	12.53		2932	10.89	
2833	12.11		2883	11.85		2933	11.51	
2834	13.70		2884	12.54		2934	12.98	
2835	11.54		2885	13.04		2935	14.19	
2836	11.90		2886	11.45		2936	14.30	
2837	12.63		2887	11.22		2937	13.02	
2838	11.63		2888	10.31		2938	11.92	
2839	12.86		2889	13.77		2939	11.69	
By Dam 405			By Dam 410			By Dam 415		
2841	11.35	511	2891	14.43	502	2941	13.24	509
2842	11.62		2892	11.24		2942	13.03	
2843	11.31		2893	11.55		2943	13.21	
2844	13.05		2894	11.42		2944	12.53	
2845	12.54		2895	11.70		2945	13.96	
2846	11.47		2896	11.79		2946	13.39	
2847	11.54		2897	11.75		2947	12.39	
2848	12.53		2898	12.56		2948	13.53	
2849	12.60		2899	12.11		2949	12.92	

TABLE 23.—Continued

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 416</i>			<i>By Dam 419</i>			<i>By Dam 422</i>		
2951	13.37		2981	12.34		3011	13.73	
2952	12.58		2982	13.03		3012	12.30	
2953	11.74		2983	12.37		3013	11.96	
2954	12.29		2984	13.00		3014	12.78	
2955	11.63		2985	14.59	504	3015	12.88	
2956	11.99		2986	12.73		3016	11.10	
2957	12.14		2987	13.30		3017	12.86	
2958	12.35		2988	12.01		3018	12.16	
2859	11.91		2889	12.23		3019	13.22	
<i>By Dam 417</i>			<i>By Dam 420</i>			<i>By Dam 423</i>		
2961	13.85		2991	12.29		3021	11.81	
2962	11.74		2992	12.48		3022	11.90	
2963	12.43		2993	12.22		3023	13.01	
2064	12.16		2994	12.66		3024	12.29	
2965	12.36		2995	12.52		3025	11.74	
2966	13.44		2996	12.75		3026	13.01	
2967	13.40		2997	13.01		3027	13.54	
2968	14.01		2998	12.15		3028	13.89	
2969	12.87		2999	11.79		3029	13.50	
<i>By Dam 418</i>			<i>By Dam 421</i>			<i>By Dam 424</i>		
2971	12.23		3001	12.89		3031	12.49	
2972	13.47		3002	12.66		3032	10.98	
2973	12.36		3003	13.10		3033	11.24	
2974	12.17		3004	13.68		3034	11.44	
2975	12.73		3005	11.82		3035	13.00	
2976	12.16		3006	12.77		3036	12.11	
2977	11.59		3007	11.67		3037	11.98	
2878	10.52		3008	13.16		3038	9.34	
2979	13.81		3009	13.31		3039	11.46	

TABLE 24.—FIFTH GENERATION HIGH PROTEIN PLOT RECORD, 1901

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crop harvested.			Seed ear planted.	Crop harvested.
501	413	14.38	14.78	508	413	15.40	15.21
502	410	14.43	13.76	509	412	15.20	14.22
503	412	14.54	14.10	510	407	14.63	13.61
504	419	14.59	15.02	511	403	14.56	13.83
505	413	14.98	13.37	512	413	14.45	14.19
506	411	15.21	14.07	513	411	14.43	13.61
507	413	15.71	14.44	514	401	14.35	13.46
...	...	.....	.....	*515	402	14.01	13.37
Average of plot.						14.78	14.12

*Planted in Special High-Protein Plot:—not included in average.

TABLE 25.—PROTEIN IN SIXTY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1901
AND SEVENTY-TWO ADDITIONAL EARS FROM SPECIAL HIGH-PROTEIN PLOT

Annual ear No.	Protein, percent.	Register No. assigned	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 501</i>			<i>By Dam 509</i>			3563	12.70	
3611	14.78		3691	15.03	613	3564	10.60	
3612	16.03		3692	13.77		3565	13.69	
3613	13.57		3693	12.84		3566	14.78	
3614	14.84		<i>By Dam 510</i>			3567	13.61	
<i>By Dam 502</i>			3701	12.19		3568	15.27	
3621	13.15		3702	14.85		3569	12.75	
<i>By Dam 503</i>			3703	14.33		3591	14.62	
3631	14.12		3704	12.36		3592	13.93	
3632	13.62		3705	14.56		3593	15.05	602
<i>By Dam 504</i>			3706	13.00		3594	13.26	
3641	15.51	610	<i>By Dam 511</i>			3595	14.71	
3642	14.64		3711	14.35		3596	13.18	
3643	14.68		3712	11.59		3597	14.98	
3644	14.89		3713	11.80		3598	12.49	
3645	14.85		3714	13.24		3599	15.58	605
3646	14.27		<i>By Dam 512</i>			<i>By Dam 515</i>		
3647	12.78		3721	12.63		Grown in Special High Protein Plot.		
3648	14.22		3722	15.80	608	3521	13.73	
<i>By Dam 505</i>			3723	12.67		3522	12.73	
3651	13.02		3724	15.65	609	3523	13.46	
3652	12.17		<i>By Dam 513</i>			3524	13.87	
3653	14.63		3731	13.99		3525	13.12	
3654	13.57		3732	14.51		3526	14.93	614
3655	12.94		3733	12.01		3527	11.56	
3656	12.96		3734	12.86		3528	13.40	
3657	12.80		3735	14.27		3529	13.93	
3658	13.14		<i>By Dam 514</i>			3541	13.78	
3659	13.56		3741	11.50		3542	11.78	
<i>By Dam 506</i>			3742	14.37		3543	12.80	
3661	15.41	604	3743	13.86		3544	13.54	
3662	13.20		3744	13.34		3545	13.16	
3663	11.82		<i>By Dam 507</i>			3546	13.47	
3664	14.17		Grown in Special High Protein Plot.			3547	12.21	
<i>By Dam 507</i>			3531	13.29		3548	13.09	
3671	14.54		3532	12.33		3549	11.76	
3672	14.88		3533	11.96		3551	14.88	
<i>By Dam 508</i>			3534	14.25		3552	13.85	
3681	13.47		3535	13.84		3553	13.16	
3682	15.38		3536	15.17	612	3554	11.08	
3683	15.49		3537	15.00	601	3555	12.23	
3684	14.51		3538	16.12	607	3556	13.28	
			3539	14.20		3557	14.12	
			3561	12.86		3558	14.61	
			3562	15.40	611	3559	14.80	
						3571	14.69	
						3572	12.08	
						3573	11.18	
						3574	13.67	
						3575	13.07	
						3576	8.94	
						3577	13.58	

Annual ear No.	Protein, percent.	Register No. assigned.
3578	13.33	606
3579	15.76	
3581	12.17	
3582	15.01	
3583	13.58	
3584	13.75	603
3585	15.21	
3586	13.82	
3587	13.13	
3588	14.77	
3589	14.12	

Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crop harvested.
601	507	15.00	12.47
601	507	15.05	12.83
603	515	15.21	.....
604	506	15.41	11.59
605	507	15.58	12.44
606	515	15.76	.....
607	507	16.12	12.32

Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crop harvested.
608	512	15.80	.....
609	512	15.65	12.44
610	504	15.51	11.76
611	507	15.40	13.17
612	507	15.17	11.93
613	509	15.03	12.42
614	515	14.93	.....
Average of ten selected rows.		15.39	12.34

TABLE 27.—PROTEIN IN NINETY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1902

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 601			By Dam 605			By Dam 611		
4171	13.07	710	4201	13.44	707	4241	12.81	708
4172	12.64		4202	14.22		4242	14.29	
4173	12.82		4203	13.76	720	4243	12.76	709
4174	14.70		4204	13.50		4244	14.49	
4175	13.51		4205	13.32	4245	13.79	703	
4176	13.51		4206	13.47	4246	13.19		
4177	12.29		4207	13.13	4247	10.48	701	
4178	13.62		4208	13.32	4248	13.70		
4179	13.38		4209	13.06	4249	12.68		
By Dam 602			By Dam 607			By Dam 612		
4181	12.11	719	4211	13.14	713	4251	12.28	711
4182	13.80		4212	14.62		4252	12.15	
4183	11.84	721	4213	13.86	704	4253	15.01	
4184	12.32		4214	13.31		4254	12.50	
4185	13.72		4215	14.12	716	4255	12.02	
4186	12.86	715	4216	14.02		717	4256		13.22
4187	14.25		4217	11.50	4257		12.49	
4188	13.30	712	4218	14.37	714	4258	11.04	
4189	14.75		4219	13.66		4259	12.66	
By Dam 604			By Dam 609			By Dam 613		
4191	11.77		4221	13.28	702	4261	11.60	705
4192	12.32		4222	13.30		4262	12.36	
4193	13.28		4223	10.88		4263	12.99	
4194	13.08		4224	13.42		4264	13.67	
4195	12.16		4225	13.76		4265	13.98	
4196	11.69		4226	13.45		4266	12.36	
4197	12.54		4227	14.03	706	4267	12.91	
4198	12.73		4228	11.09		4268	12.53	
4199	9.99		4229	12.99		4269	13.02	
			By Dam 610					
			4231	13.89	718			
			4232	13.68		722		
			4233	11.00				
			4234	9.80				
			4235	13.12				
			4236	11.79				
			4237	11.86				
			4238	9.54				
			4239	12.17				

TABLE 29.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1903

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 705</i>			<i>By Dam 712</i>			<i>By Dam 717</i>		
1	13.68		41	13.02		81	13.92	
2	11.98		42	12.30		82	14.30	
3	14.42		43	12.02		83	13.12	
4	14.40		44	12.71		84	13.06	
5	14.60	822	45	13.94		85	12.51	
6	12.64		46	12.78		86	8.47	
7	11.49		47	14.30		87	14.90	818
8	11.39		48	13.77		88	14.88	804
9	13.44		49	14.37		89	14.28	
10	13.49		50	13.14		90	10.47	
<i>By Dam 706</i>			<i>By Dam 713</i>			<i>By Dam 718</i>		
11	14.42		51	14.85	819	91	14.26	
12	11.35		52	13.44		92	14.38	
13	12.96		53	15.21	806	93	15.23	816
14	13.85		54	14.76	802	94	13.91	
15	12.57		55	12.95		95	13.98	
16	11.18		56	13.82		96	10.93	
17	15.34	808	57	12.66		97	10.84	
18	12.22		58	14.56		98	12.68	
19	15.40	813	59	14.78	820	99	10.37	
20	14.75	801	60	13.65		100	11.62	
<i>By Dam 709</i>			<i>By Dam 714</i>					
21	13.58		61	13.34				
22	14.95	805	62	11.87				
23	11.87		63	13.07				
24	15.30	815	64	14.00				
25	12.51		65	13.26				
26	14.34		66	12.56				
27	15.12	817	67	12.81				
28	15.55	812	68	12.22				
29	15.38	809	69	13.30				
30	14.83	803	70	13.90				
<i>By Dam 710</i>			<i>By Dam 716</i>					
31	14.76	821	71	11.09				
32	13.42		72	11.01				
33	15.37	814	73	14.50				
34	17.33	811	74	13.76				
35	14.56		75	12.28				
36	13.80		76	13.68				
37	15.45	810	77	15.24	807			
38	14.08		78	12.37				
39	11.47		79	14.34				
40	14.40		80	12.69				

TABLE 31.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1904

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 803</i>			<i>By Dam 809</i>			<i>By Dam 816</i>		
1	13.88		31	13.68		71	14.83	
2	14.10		32	16.35	921	72	14.07	
3	15.54		33	14.77		73	14.38	
4	16.41	907	34	14.65		74	15.17	
5	16.89	904	35	15.69		75	16.24	909
6	15.30		36	13.81		76	13.52	
7	17.00	913	37	14.64		77	14.20	
8	13.48		38	16.57	918	78	13.12	
9	14.64		39	15.64		79	13.40	
10	15.38		40	14.18		80	12.94	
<i>By Dam 806</i>			<i>By Dam 811</i>			<i>By Dam 818</i>		
11	16.60	906	41	17.79	916	81	13.22	
12	13.90		42	17.07		82	15.43	
13	16.77	924	43	14.74		83	15.97	911
14	15.43		44	15.83		84	14.63	
15	14.06		45	17.53	902	85	13.07	
16	14.28		46	17.73	914	86	13.43	
17	15.10		47	14.41		87	16.76	922
18	14.00		48	16.26		88	15.18	
19	14.46		49	16.71		89	14.65	
20	13.18		50	17.38	905	90	15.15	
<i>By Dam 808</i>			<i>By Dam 812</i>			<i>By Dam 820</i>		
21	16.49	901	51	15.39		91	15.83	903
22	12.72		52	17.04	915	92	15.92	
23	14.21		53	16.43	919	93	14.83	
24	14.77		54	16.78	923	94	12.62	
25	13.80		55	15.94		95	14.38	
26	13.75		56	14.75		96	15.85	917
27	13.46		57	14.18		97	16.52	910
28	13.95		58	13.87		98	14.17	
29	16.75	908	59	15.00		99	13.22	
30	10.61		60	15.73		100	14.52	
			<i>By Dam 814</i>					
			61	15.74				
			62	16.28	912			
			63	13.62				
			64	16.50	920			
			65	15.72				
			66	13.90				
			67	14.60				
			68	15.62				
			69	16.13				
			70	16.33	925			

TABLE 32.—NINTH GENERATION HIGH PROTEIN PLOT RECORD, 1905

[illegible]

TABLE 33.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1905

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 912</i>			<i>By Dam 918</i>			<i>By Dam 922</i>		
1	13.84		41	14.65		81	15.43	
2	13.82		42	14.00		82	13.38	
3	15.30		43	15.83	1011	83	14.06	
4	12.77		44	14.71		84	16.16	1010
5	14.35		45	14.86		85	14.83	
6	12.91		46	13.95		86	12.74	
7	15.52	1007	47	14.51		87	15.25	
8	15.84	1002	48	15.87	1023	88	15.30	
9	13.39		49	16.58	1006	89	15.71	1003
10	13.82		50	14.59		90	14.79	
11	11.31		51	14.02		91	14.59	
12	12.98		52	13.87		92	14.89	
13	13.99		53	13.15		93	.....	
14	15.81	1014	54	15.07		94	14.78	
15	15.22		55	14.29		95	12.84	
16	13.48		56	15.29		96	15.39	
17	14.70		57	16.10	1018	97	15.10	
18	10.77		58	15.36		98	13.87	
19	15.62	1019	59	14.54		99	15.72	1022
20	13.99		60	13.81		100	15.65	1015
<i>By Dam 914</i>			<i>By Dam 920</i>			<i>By Dam 924</i>		
21	16.00		61	15.41		101	14.75	
22	14.94		62	15.19		102	14.79	
23	14.25		63	16.87	1008	103	15.21	
24	16.32		64	12.44		104	15.56	
25	12.80		65	14.55		105	15.95	1012
26	17.35	1009	66	13.47		106	17.05	1024
27	14.95		67	15.46		107	15.05	
28	14.24		68	15.78		108	15.88	1005
29	15.02		69	15.87	1001	109	12.00	
30	15.01		70	15.99	1020	110	15.38	
31	15.15		71	13.08		111	11.03	
32	14.74		72	15.25		112	14.60	
33	12.92		73	15.88	1013	113	15.74	1017
34	14.45		74	15.85		114	16.59	
35	17.39	1004	75	13.99		115	14.02	
36	15.23		76	14.71		116	15.44	
37	15.68	1016	77	14.36		117	14.97	
38	12.25		78	14.11		118	14.12	
39	17.30	1021	79	14.79		119	15.26	
40	15.74		80	15.28		120	13.90	

[illegible]

TABLE 35.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1906

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 1004</i>			<i>By Dam 1010</i>			<i>By Dam 1020</i>		
1	17.13	1102	41	14.17		81	16.11	1110
2	15.56		42	13.94		82	14.36	
3	16.62	1114	43	11.84		83	12.64	
4	14.57		44	14.00		84	14.27	
5	13.83		45	13.14		85	15.57	
6	11.73		46	14.75		86	15.00	
7	15.02		47	14.42		87	14.62	
8	14.07		48	14.37		88	12.57	
9	13.89		49	12.50		89	13.69	
10	13.85		50	14.96		90	14.15	
11	13.02		51	13.93		91	14.46	
12	13.88		52	15.69	1111	92	14.12	
13	15.76	1107	53	15.54	1106	93	15.74	1103
14	13.98		54	15.16	1123	94	15.63	1115
15	12.69		55	17.67	1118	95	13.51	
16	12.04		56	14.91		96	14.19	
17	14.87		57	13.67		97	13.25	
18	15.79	1119	58	13.50		98	14.79	
19	14.14		59	14.70		99	14.48	
20	14.56		60	14.16		100	16.17	1122
<i>By Dam 1006</i>			<i>By Dam 1012</i>			<i>By Dam 1022</i>		
21	14.88		61	14.17		101	16.11	1105
22	12.87		62	15.58	1113	102	13.77	
23	12.61		63	14.85		103	14.14	
24	14.72		64	11.09		104	14.11	
25	12.75		65	14.21		105	13.15	
26	12.85		66	13.59		106	11.30	
27	16.30	1104	67	12.44		107	12.91	
28	15.44	1109	68	14.07		108	15.82	1112
29	15.01		69	15.35	1101	109	16.48	1124
30	15.26		70	14.45		110	10.46	
31	13.37		71	11.42		111	14.79	
32	16.06	1116	72	12.19		112	14.36	
33	13.31		73	13.40		113	12.47	
34	15.20		74	14.89		114	12.06	
35	15.93	1121	75	13.58		115	14.93	
36	15.08		76	13.94		116	12.62	
37	13.78		77	16.36	1120	117	14.10	
38	14.95		78	12.82		118	14.28	
39	14.44		79	14.18		119	15.65	
40	14.08		80	15.79	1108	120	15.78	1117

TABLE 36.—FIRST GENERATION LOW PROTEIN PLOT RECORD, 1897

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Cropharvested.			Seed ear planted.	Cropharvested.
101		9.31	†	*107		8.40	{ 10.36
102		9.12	10.55				{ 10.20
103		9.08	10.89	108		9.22	9.89
104		9.15	10.26	109		9.33	10.24
105		8.38	10.10	110		9.36	11.20
*106		8.25	{ 10.73	111		9.30	12.24
			{ 9.90	112		9.47	†
Average of ten rows †						8.96	10.55

†Analyses of seed for rows that are not represented in the harvest are not included in the plot average.

*Crop from Reg. Nos. 106 and 107 were sampled in duplicate.

TABLE 37.—PROTEIN IN FORTY-EIGHT INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1897

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 102</i>			<i>By Dam 106</i>			<i>By Dam 108</i>		
411	11.37		431	10.98		451	10.80	
412	11.47		432	9.67	212	452	10.07	
413	11.36		433	9.91		453	12.13	
414	11.15		434	12.85		454	10.04	
<i>By Dam 103</i>			<i>*By Dam 106</i>			<i>By Dam 109</i>		
416	8.88	208	436	9.38	211	456	10.16	
417	9.26	203	437	10.03		457	10.22	
418	11.62		438	10.97		458	8.22	206
419	10.43		439	9.28	210	459	11.92	
<i>By Dam 104</i>			<i>By Dam 107</i>			<i>By Dam 110</i>		
421	9.60	201	441	10.25		461	11.61	
422	9.93		442	10.28		462	10.85	
423	12.45		443	11.40		463	10.04	
424	10.43		444	9.34	202	464	11.68	
<i>By Dam 105</i>			<i>*By Dam 107</i>			<i>By Dam 111</i>		
426	11.46		446	8.84	205	466	13.98	
427	8.29	207	447	11.27		467	12.55	
428	10.19		448	9.05	209	468	13.89	
429	9.69		449	8.95	204	469	12.19	

*An extra set of ears were analyzed from Dams 106 and 107

TABLE 38.—SECOND GENERATION LOW PROTEIN PLOT RECORD, 1898

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crop har-vested.			Seed ear planted.	Crop har-vested.
201	104	9.60	10.92	*207	105	8.29	} 10.43 11.14
202	107	9.34	11.00				
203	103	9.26	11.03	208	103	8.88	10.68
204	107	8.95	10.06	209	107	9.05	11.16
205	107	8.84	9.83	210	106	9.28	9.93
*206	109	8.22	{ 10.26	211	106	9.38	10.27
			{ 10.19	212	106	9.67	10.83
Average of plot						9.06	10.55

*Crop from Reg. Nos. 206 and 207 were sampled in duplicate.

TABLE 39.—PROTEIN IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1898

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 201			By Dam 206			By Dam 209		
1101	9.26	309	1151	8.90	315	1201	12.70	
1102	10.25		1152	10.62		1202	11.02	
1103	10.73		1153	9.33		1203	10.97	
1104	7.76		1154	9.52		1204	10.89	
1105	12.78		1155	11.00		1205	10.25	
1106	11.36		1156	10.68		1206	12.31	
1107	10.17		1157	10.30		1207	11.35	
1108	12.49		1158	13.04		1208	9.81	
1109	11.98		1159	9.02	301	1209	9.60	
By Dam 202			*By Dam 206			By Dam 210		
1111	9.99		1161	10.93	310	1211	8.66	303
1112	11.07		1162	10.58		1212	9.87	
1113	11.26		1163	10.24		1213	11.63	
1114	11.09		1164	9.41		1214	9.45	
1115	10.40		1165	7.85		1215	10.78	
1116	11.11		1166	11.71		1216	9.99	
1117	11.33		1167	8.29		1217	9.87	
1118	10.70		1168	11.65		1218	10.22	
1119	11.41		1169	9.90		1219	8.82	314
By Dam 203			By Dam 207			By Dam 211		
1121	11.87		1171	10.10	313	1221	11.51	311
1122	9.57		1172	10.71		1222	11.28	
1123	10.48		1173	8.63		1223	10.94	
1124	10.28		1174	10.34		1224	10.63	
1125	10.87		1175	11.32		1225	8.32	
1126	13.36		1176	10.93		1226	10.16	
1127	11.44		1177	11.66		1227	9.18	
1128	9.45		1178	9.66		1228	8.78	
1129	11.60		1179	11.10		1229	10.74	
By Dam 204			*By Dam 207			By Dam 212		
1131	8.58	312	1181	16.08	316	1231	10.44	
1132	12.97	1182	12.30	1232		11.27		
1133	7.85	307	1183	13.25		1233	10.30	
1134	9.24	1184	8.95	1234		12.46		
1135	11.81	1185	11.36	1235		9.52		
1136	11.77	1186	9.46	1236		10.02		
1137	8.80	1187	11.42	1237		11.34		
1138	10.97	1188	8.83	302		1238	10.54	
1139	8.57	305	1189	10.19		1239	10.09	
By Dam 205			By Dam 208					
1141	10.58	308	1191	9.71				
1142	11.21		1192	11.38				
1143	10.21		1193	9.15				
1144	7.50		1194	12.48				
1145	9.67		1195	11.48				
1146	9.56		1196	10.41				
1147	9.54		1197	11.59				
1148	10.15		1198	10.85				
1149	8.62		304	1199		9.26		

*An extra set of ears were analyzed from Dams 206 and 207.

[illegible]

TABLE 41.—PROTEIN IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-
PROTEIN PLOT OF 1899

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 301</i>			<i>By Dam 306</i>			<i>By Dam 311</i>		
1841	9.49		1891	8.54		1941	9.66	
1842	8.66		1892	9.13		1942	8.66	
1843	9.17		1893	8.68		1943	8.71	
1844	9.11		1894	8.47	409	1944	8.83	
1845	8.97		1895	6.66	408	1945	9.11	
1846	11.49		1896	9.40		1946	10.15	
1847	9.56		1897	9.00		1947	9.29	
1848	9.74		1898	8.79		1948	9.86	
1849	9.72		1899	9.66		1949	9.54	
<i>By Dam 302</i>			<i>By Dam 307</i>			<i>By Dam 312</i>		
1851	10.16		1901	10.49		1951	9.84	
1852	8.82		1902	9.04		1952	10.57	
1853	9.26		1903	8.95		1953	9.93	
1854	10.07		1904	9.89		1954	9.76	
1855	11.29		1905	9.92		1955	9.27	
1856	9.69		1906	10.91		1956	9.85	
1857	10.23		1907	10.04		1957	10.15	
1858	8.63	416	1908	10.24		1958	10.74	
1859	8.57	415	1909	8.08	404	1959	9.12	
<i>By Dam 303</i>			<i>By Dam 308</i>			<i>By Dam 313</i>		
1861	9.48		1911	9.52		1961	9.62	
1862	10.23		1912	8.41		1962	10.57	
1863	10.77		1913	9.50		1963	11.99	
1864	9.74		1914	9.26		1964	10.27	
1865	10.34		1915	8.39		1965	9.55	
1866	9.96		1916	9.26		1966	8.54	402
1867	9.30		1917	8.62	401	1967	9.99	
1868	9.01		1918	9.18		1968	10.19	
1869	10.38		1919	7.74	406	1969	13.06	
<i>By Dam 304</i>			<i>By Dam 309</i>			<i>By Dam 314</i>		
1871	9.27		1921	7.49	407	1971	9.66	
1872	8.70		1922	8.61		1972	8.44	403
1873	10.54		1923	7.98	405	1973	8.85	
1874	9.20		1924	9.89		1974	9.72	
1875	9.44		1925	7.60	410	1975	10.28	
1876	10.19		1926	8.41		1976	8.74	
1877	8.18	413	1927	9.44		1977	11.27	
1878	10.99		1928	9.42		1978	10.13	
1879	12.66		1929	8.67		1979	10.26	
<i>By Dam 305</i>			<i>By Dam 310</i>			<i>By Dam 315</i>		
1881	7.83	411	1931	11.62		1981	9.54	
1882	9.53		1932	10.12		1982	9.00	
1883	10.98		1933	10.15		1983	9.06	
1884	7.61		1934	10.01		1984	9.09	
1885	9.84		1935	8.47	414	1985	9.57	
1886	9.52		1936	11.76		1986	8.95	
1887	8.94		1937	10.14		1987	8.03	412
1888	9.17		1938	9.59		1988	10.48	
1889	8.48		1939	11.86		1989	9.64	

TABLE 41. (Continued.)

Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 316</i>		
1991	10.33	
1992	10.46	
1993	9.34	
1994	9.96	
1995	10.70	
1996	10.09	
1997	11.28	
1998	10.59	
1999	10.86	

TABLE 42.—FOURTH GENERATION LOW PROTEIN PLOT RECORD, 1900

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crophar-vested.			Seed ear planted.	Crophar-vested.
401	308	8.62	9.14	409	306	8.47	9.03
402	313	8.54	9.54	410	309	7.60	9.08
403	314	8.44	9.20	411	305	7.83	9.97
404	307	8.08	9.09	412	315	8.03	9.39
405	309	7.98	9.04	413	304	8.18	9.09
406	308	7.74	9.08	414	310	8.47	9.41
407	309	7.49	9.35	415	302	8.57	9.53
408	306	6.66	8.84	416	302	8.63	10.72
Average of plot						8.08	9.34

TABLE 43.—PROTEIN IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1900

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 401</i>			<i>By Dam 406</i>			<i>By Dam 411</i>		
3041	9.82		3091	8.50		3141	7.54	510
3042	9.08		3092	8.37		3142	8.15	
3043	9.58		3093	9.28		3143	10.02	
3044	8.02		3094	8.60		3144	11.05	
3045	7.96		3095	8.30		3145	8.87	
3046	7.62	511	3096	7.91		3146	9.54	
3047	8.61		3097	10.26		3147	11.32	
3048	9.36		3098	7.67	503	3148	10.73	
3049	8.55		3099	8.25		3149	12.29	
<i>By Dam 402</i>			<i>By Dam 407</i>			<i>By Dam 412</i>		
3051	8.44		3101	8.27		3151	10.76	
3052	8.90		3102	8.39		3152	11.16	
3053	9.47		3103	11.85		3153	11.12	
3054	9.67		3104	8.57		3154	10.12	
3055	7.90	514	3105	9.13		3155	7.78	513
3056	8.95		3106	10.13		3156	8.69	
3057	10.90		3107	8.52		3157	9.14	
3058	8.34		3108	7.79	501	3158	10.05	
3059	10.23		3109	9.81		3159	9.34	
<i>By Dam 403</i>			<i>By Dam 408</i>			<i>By Dam 413</i>		
3061	8.40		3111	7.90		3161	9.39	
3062	9.04		3112	8.57		3162	9.85	
3063	7.50	505	3113	8.04		3163	8.14	
3064	8.60		3114	8.18		3164	8.74	
3065	9.95		3115	7.26	508	3165	9.21	
3066	7.43	506	3116	9.79		3166	8.54	
3067	9.71		3117	8.14		3167	9.54	
3068	10.19		3118	11.83		3168	8.87	
3069	7.67		3119	8.67		3169	9.72	
<i>By Dam 404</i>			<i>By Dam 409</i>			<i>By Dam 414</i>		
3071	7.75	502	3121	9.58		3171	8.14	
3072	9.08		3122	8.12		3172	10.12	
3073	10.53		3123	8.93		3173	8.68	
3074	8.09		3124	8.02		3174	9.31	
3075	9.81		3125	8.46		3175	8.86	
3076	9.32		3126	9.33		3176	9.28	
3077	9.36		3127	9.56		3177	8.16	
3078	7.08	507	3128	9.19		3178	8.81	
3079	10.08		3129	8.28		3179	8.70	
<i>By Dam 405</i>			<i>By Dam 410</i>			<i>By Dam 415</i>		
3081	7.49	509	3131	8.72		3181	8.40	
3082	9.53		3132	8.49		3182	10.89	
3083	8.56		3133	7.70	512	3183	10.91	
3084	8.48		3134	9.66		3184	9.85	
3085	8.24		3135	9.18		3185	9.91	
3086	9.77		3136	9.17		3186	8.55	
3087	9.67		3137	8.17		3187	9.03	
3088	10.47		3138	10.31		3188	8.92	
3089	9.99		3139	7.56	504	3189	9.94	

TABLE 44.—FIFTH GENERATION LOW PROTEIN PLOT RECORD 1901

TABLE 45.—PROTEIN IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-
PROTEIN PLOT OF 1901

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 501</i>			<i>By Dam 506</i>			<i>By Dam 511</i>		
3751	9.79		3801	9.56		3851	9.24	
3752	9.85		3802	10.30		3852	10.25	
3753	11.03		3803	9.03		3853	12.82	
3754	9.17		3804	8.36	602	3854	10.93	
3755	10.22		3805	9.61		3855	9.73	
3756	10.32		3806	9.80		3856	9.98	
3757	10.12		3807	9.78		3857	10.78	
3758	9.01		3808	8.36	613	3858	9.91	
3759	8.89		3809	9.77		3859	8.22	
<i>By Dam 502</i>			<i>By Dam 507</i>			<i>By Dam 512</i>		
3761	8.37	614	3811	10.26		3861	8.61	
3762	7.77	609	3812	9.03		3862	8.72	
3763	9.08		3813	9.70		3863	8.93	
3764	8.14	610	3814	11.22		3864	10.03	
3765	8.44		3815	11.39		3865	9.35	
3766	10.37		3816	9.27		3866	8.78	
3767	8.43		3817	8.92		3867	9.75	
3768	11.63		3818	10.50		3868	12.47	
3769	11.11		3819	10.52		3869	10.79	
<i>By Dam 503</i>			<i>By Dam 508</i>			<i>By Dam 513</i>		
3771	8.20	611	3821	8.83		3871	9.40	
3772	9.33		3822	10.29		3872	8.71	
3773	9.44		3823	10.05		3873	7.54	607
3774	10.03		3824	9.11		3874	9.06	
3775	8.41	601	3825	10.24		3875	9.05	
3776	9.52		3826	9.05		3876	10.84	
3777	10.51		3827	9.68		3877	8.87	
3778	9.88		3828	9.08		3878	9.53	
3779	9.60		3829	9.66		3879	9.79	
<i>By Dam 504</i>			<i>By Dam 509</i>			<i>By Dam 514</i>		
3781	8.41		3831	9.83		3881	9.61	
3782	9.18		3832	13.05		3882	7.66	606
3783	11.38		3833	11.44		3883	9.60	
3784	8.49		3834	10.54		3884	11.75	
3785	10.83		3835	9.57		3885	8.03	605
3786	8.68		3836	10.23		3886	8.25	603
3787	8.49		3837	12.02		3887	11.34	
3788	10.72		3838	9.23		3888	8.53	
3789	11.18		3839	11.59		3889	10.97	
<i>By Dam 505</i>			<i>By Dam 510</i>					
3791	9.45		3841	8.73				
3792	9.16		3842	7.59	608			
3793	10.19		3843	8.53				
3794	8.19		3844	10.26				
3795	10.41		3845	9.20				
3796	8.53		3846	8.19	604			
3797	8.34	612	3847	9.52				
3798	9.08		3848	8.73				
3799	10.39		3849	8.81				

TABLE 46.—SIXTH GENERATION LOW PROTEIN PLOT RECORD 1902

Register ear No.	By Dam No.	Protein, percent.		Register ear No.	By Dam No.	Protein, percent.	
		Seed ear planted.	Crophar. vested.			Seed ear planted.	Crophar. vested.
601	503	8.41	8.03	608	510	7.59	8.01
602	506	8.36	7.78	609	502	7.77	
603	514	8.25	7.63	610	502	8.14	8.53
604	510	8.19		611	503	8.20	
605	514	8.03	8.47	612	505	8.34	8.29
606	514	7.66	8.43	613	506	8.36	8.47
607	513	7.54		614	502	8.37	8.57
Average of ten selected rows						8.15	8.22

TABLE 47.—PROTEIN IN NINETY INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1902

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 601</i>			<i>By Dam 605</i>			<i>By Dam 612</i>		
4271	7.66		4301	7.96		4341	7.57	
4272	9.05		4302	9.38		4342	8.15	
4273	7.89		4303	8.04		4343	8.11	
4274	8.63		4304	8.41		4344	7.73	
4275	7.74		4305	7.53		4345	8.70	
4276	6.98	707	4306	8.20		4346	6.84	708
4277	7.78		4307	7.63		4347	7.94	
4278	9.69		4308	7.65		4348	7.94	
4279	7.46		4309	7.57		4349	8.10	
<i>By Dam 602</i>			<i>By Dam 606</i>			<i>By Dam 613</i>		
4281	6.61	714	4311	9.44		4351	7.52	
4282	8.89		4312	8.31		4352	8.17	
4283	8.31		4313	7.01	706	4353	7.80	
4284	8.52		4314	7.65		4354	7.47	
4285	7.46		4315	7.43	701	4355	7.59	
4286	6.86	715	4316	8.47		4356	9.12	
4287	6.37	712	4317	8.03		4357	8.63	
4288	7.59		4318	7.62		4358	9.48	
4289	7.50		4319	8.27		4359	7.23	704
<i>By Dam 603</i>			<i>By Dam 608</i>			<i>By Dam 614</i>		
4291	7.47		4321	7.09	717	4361	8.38	
4292	7.36	702	4322	6.42	710	4362	7.94	
4293	7.97		4323	7.22	718	4363	8.46	
4294	7.91		4324	9.14		4364	7.62	
4295	6.45	713	4325	7.42	721	4365	8.63	
4296	7.29	720	4326	7.00	716	4366	8.51	
4297	7.52		4327	9.53		4367	7.45	722
4298	7.24	719	4328	6.37	711	4368	6.48	709
4299	7.12	705	4329	8.20		4369	8.21	
			<i>By Dam 610</i>					
			4331	8.38				
			4332	8.44				
			4333	7.73				
			4334	8.10				
			4335	7.67				
			4336	7.78				
			4337	7.27	703			
			4338	7.70				
			4339	7.85				

[illegible]

TABLE 49.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1903

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 702</i>			<i>By Dam 706</i>			<i>By Dam 711</i>		
1	8.58		31	7.73		71	7.17	
2	8.40		32	7.43		72	8.41	
3	8.56		33	8.69		73	8.10	
4	6.82	815	34	6.67		74	7.77	
5	8.41		35	7.20		75	7.92	
6	7.14	805	36	7.56		76	7.28	803
7	8.37		37	8.95		77	6.80	814
8	8.43		38	7.41		78	8.01	
9	6.89	816	39	8.01		79	6.79	809
10	7.26	819	40	8.03		80	9.50	
<i>By Dam 703</i>			<i>By Dam 707</i>			<i>By Dam 715</i>		
11	9.14		41	8.26		81	7.95	
12	8.86		42	7.34	801	82	7.30	820
13	8.20		43	7.37		83	10.05	
14	7.85		44	6.75	813	84	7.41	
15	9.26		45	10.20		85	8.14	
16	9.48		46	9.05		86	7.74	
17	8.21		47	9.35		87	9.00	
18	8.43		48	9.34		88	7.23	804
19	8.00		49	7.80		89	7.37	
20	7.36	822	50	8.82		90	6.38	811
<i>By Dam 704</i>			<i>By Dam 708</i>			<i>By Dam 716</i>		
21	7.00	817	51	6.54	812	91	8.13	
22	6.80	808	52	8.55		92	8.37	
23	7.19	818	53	8.61		93	8.60	
24	6.62	810	54	8.21		94	8.57	
25	7.32	821	55	8.61		95	8.61	
26	6.99	806	56	8.10		96	7.86	
27	8.85		57	8.16		97	7.87	
28	7.35		58	9.08		98	8.61	
29	7.74		59	8.19		99	6.87	807
30	7.31	802	60	9.42		100	7.95	
			<i>By Dam 710</i>					
			61	7.61				
			62	9.27				
			63	7.56				
			64	7.64				
			65	8.34				
			66	7.61				
			67	7.72				
			68	8.37				
			69	10.05				
			70	8.00				

[illegible]

TABLE 51.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1904

Annual ear No.	Protein, percent	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.			
By Dam 802			By Dam 807			By Dam 815					
1	7.60	902	31	9.00	903	71	8.13	918			
2	7.71		32	7.80		72	8.30				
3	7.83		33	7.95		73	7.39				
4	8.83		34	8.44		74	7.15				
5	9.41		35	8.64		75	7.57				
6	7.96		36	8.21		76	7.63				
7	7.24	911	37	7.31	916	77	7.26	925			
8	9.82		38	8.51		78	7.87				
9	8.14		39	6.36		79	8.93				
10	9.61		40	8.22		80	6.57				
By Dam 803			By Dam 809			By Dam 818					
11	8.94	908	41	8.68	907	81	7.86	921			
12	6.13		42	9.24		82	8.75				
13	7.24		43	9.60		83	7.76				
14	7.69		44	7.87		84	8.34				
15	8.67		45	7.58		85	8.84				
16	8.55		46	7.67		86	9.26				
17	6.78	914	47	7.65	913	87	7.35	921			
18	7.38		48	7.49		88	7.70				
19	7.24		49	8.71		89	8.85				
20	7.64	901	50	8.00	90	7.53	910				
By Dam 804			By Dam 810			By Dam 821					
21	8.44	923	51	8.58	905	91	8.91	919			
22	7.16		52	9.98		92	7.46				
23	7.06		53	8.87		93	7.34				
24	8.44		54	7.89		94	8.10				
25	8.71		55	7.34		95	9.88				
26	8.18		56	8.06		96	6.91				
27	7.64	906	57	8.89	922	97	8.47	924			
28	6.71		58	8.55		98	7.27				
29	9.25		59	10.46		99	7.95				
30	7.74		60	7.79		100	9.98				
			By Dam 812								
			61	9.90		917					
			62	8.05							
			63	8.19							
			64	7.88							
			65	8.77							
			66	9.47							
			67	8.63							
			68	7.51							
			69	8.93							
			70	8.25							

Register ear No.	By Dam No.	Protein, percent.		
		Seed ear planted.	Crop har- vested.	
901	803	7.24	7.96	
902	802	7.60		
903	807	7.80		
904	815	6.57		
905	810	7.34		
906	804	6.71		
907	809	7.67	8.78	
908	803	6.13		
909	807	7.95		
910	818	7.53		
911	802	7.24		
912	804	7.06		
913	809	7.65	8.68	
914	803	6.78		8.91
915	821	7.27		
916	807	7.31		
917	812	7.51		
918	815	7.15		
919	821	7.34		
920	809	7.49	8.38	
921	818	7.35		
922	810	7.79		
923	804	7.16		
924	821	6.91		8.71
925	815	7.26		
Average of six selected rows		7.09	8.57	

TABLE 53.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1905

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned	Annual ear No.	Protein, percent.	Register No. assigned.			
By Dam 902			By Dam 912			By Dam 920					
1	7.57	1007	41	8.75	1006	81	6.78	1010			
2	6.86		42	10.80		82	8.09	1003			
3	7.61		43	7.92		83	7.93				
4	7.88		44	9.97		84	7.47				
5	6.62	45	8.60	85		9.38					
6	9.06	46	9.57	86		9.52					
7	8.02	47	9.36	87		10.01					
8	8.02	48	7.24	88		9.48					
9	7.60	49	8.38	89		7.28					
10	7.87	50	8.20	90		7.86					
11	7.70	51	8.14	91		6.72	1022				
12	9.57	52	9.14	92		7.08	1015				
13	8.47	1019	53	6.96	1018	93	8.04	1003			
14	9.01		54	8.61		94	10.45				
15	7.39		55	9.83		95	7.46				
16	6.69		56	8.13		96	7.52				
17	8.59		57	7.76		97	10.04				
18	8.07		58	8.33		98	8.18				
19	8.36		59	8.38		99	8.71				
20	8.16		60	9.48		100	9.69				
By Dam 906			By Dam 914			By Dam 924					
21	9.69		1004	61		9.09	1001		101	9.80	1012
22	8.32			62		12.14			102	7.50	
23	9.05			63		7.47			103	11.39	
24	9.62	64		8.12	104	7.58		1005			
25	9.09	65		8.58	105	7.88					
26	9.23	66		8.15	106	10.06					
27	8.53	67		9.28	107	7.90					
28	9.57	68		7.21	108	9.40					
29	6.72	69		8.35	109	9.32					
30	8.54	70		8.54	110	7.38			1024		
31	8.30	71		11.43	111	9.20					
32	8.24	72		9.46	112	7.67					
33	8.88	73	7.38	113	9.36	1017					
34	9.28	74	10.00	114	7.81						
35	8.18	75	9.54	115	8.20						
36	9.20	76	9.13	116	7.68						
37	9.57	77	7.90	117	9.05						
38	8.11	78	8.76	118	8.28						
39	7.62	79	9.20	119	9.68						
40	9.81	80	8.53	120	9.05						

TABLE 55.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1906

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
<i>By Dam 1006</i>			<i>By Dam 1012</i>			<i>By Dam 1016</i>		
1	10.54		41	8.12		81	7.99	
2	8.80		42	9.02		82	8.19	
3	7.52	1107	43	9.83		83	7.54	1110
4	10.38		44	8.08		84	7.67	1103
5	10.32		45	9.48		85	7.36	1122
6	7.61	1119	46	8.88		86	8.92	
7	9.46		47	7.92	1106	87	8.14	
8	9.38		48	9.48		88	9.63	
9	10.17		49	8.15		89	10.91	
10	9.23		50	8.53		90	9.78	
11	9.00		51	8.87		91	7.93	
12	8.70		52	8.05	1111	92	9.07	
13	9.25		53	8.71		93	7.65	1115
14	9.17		54	8.18		94	9.83	
15	7.94		55	7.86	1118	95	8.97	
16	8.98		56	9.60		96	8.78	
17	8.88		57	7.97	1123	97	9.06	
18	7.51	1102	58	9.35		98	9.03	
19	10.45		59	8.65		99	7.91	
20	6.94	1114	60	9.49		100	9.67	
<i>By Dam 1010</i>			<i>By Dam 1014</i>			<i>By Dam 1018</i>		
21	8.85		61	8.19		101	7.68	1112
22	7.64		62	7.07	1108	102	9.29	
23	9.87		63	8.54		103	8.36	
24	10.17		64	7.75		104	9.70	
25	8.43		65	8.39		105	9.21	
26	7.39		66	9.36		106	8.67	
27	9.52		67	9.26		107	9.51	
28	8.70		68	7.67		108	9.29	
29	6.73	1104	69	9.17		109	9.43	
30	8.13		70	7.47		110	8.93	
31	9.92		71	9.54		111	7.71	1105
32	9.71		72	6.49	1120	112	8.49	
33	7.02	1116	73	7.41	1101	113	8.88	
34	7.96		74	8.04		114	9.36	
35	7.36	1109	75	10.63		115	7.04	1124
36	8.18		76	7.27	1113	116	8.88	
37	8.81		77	8.14		117	9.42	
38	8.53		78	8.15		118	8.05	1117
39	7.36	1121	79	7.57		119	9.07	
40	8.32		80	8.80		120	8.15	

TABLE 57.—OIL IN EIGHTY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1897

Annual ear No.	Oil percent.	Register No. assigned.	Annual ear No.	Oil percent.	Register No. assigned.	Annual ear No.	Oil percent.	Register No. assigned.
<i>By Dam 103</i>			<i>By Dam 110</i>			<i>By Dam 116</i>		
471	4.44		506	4.91		536	4.97	223
472	4.79		507	4.69		537	4.50	
473	4.42		508	5.04	221	538	4.92	
474	4.59		509	4.20		539	4.83	
<i>By Dam 104</i>			<i>By Dam 111</i>			<i>By Dam 117</i>		
476	4.84		511	5.44	210	541	4.78	
477	4.82		512	5.45	214	542	3.60	
478	5.39	209	513	5.49	213	543	4.91	
479	4.40		514	5.39	216	544	5.02	220
<i>By Dam 105</i>			<i>By Dam 112</i>			<i>By Dam 118</i>		
481	5.04		516	4.63		546	5.20	207
482	4.87		517	5.26	217	547	5.00	222
483	4.46		518	4.81		548	4.90	
484	5.07	219	519	4.44		549	4.81	
<i>By Dam 106</i>			<i>By Dam 113</i>			<i>By Dam 119</i>		
486	5.03	203	521	4.98	201	551	4.31	
487	4.20		522	4.22		552	4.33	
488	4.72		523	4.91		553	4.24	
489	4.86		524	5.68	212	554	4.33	
<i>By Dam 107</i>			<i>By Dam 114</i>			<i>By Dam 120</i>		
491	4.85		526	4.70		556	4.93	
492	4.38		527	5.43	215	557	4.68	
493	4.93		528	5.12	206	558	4.92	
494	4.97	224	529	4.68		559	5.12	218
<i>By Dam 108</i>			<i>By Dam 115</i>			<i>By Dam 121</i>		
496	4.26		531	5.04	204	561	4.41	
497	4.59		532	4.82		562	4.62	
498	4.76		533	4.98	202	563	4.95	
499	4.45		534	5.27	208	564	4.23	
<i>By Dam 109</i>						<i>By Dam 122</i>		
501	5.45	211				566	4.39	
502	4.95					567	4.20	
503	4.64					568	5.05	205
504	4.77					569	4.42	

[illegible]

TABLE 59.—OIL IN TWO HUNDRED SIXTEEN INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1898

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 201</i>			<i>By Dam 206</i>			<i>By Dam 211</i>		
1241	5.14		1291	5.29		1341	4.79	
1242	5.47		1292	4.43		1342	5.90	302
1243	4.44		1293	5.57		1343	4.68	
1244	4.66		1294	4.54		1344	5.33	
1245	4.30		1295	4.57		1345	5.70	
1246	4.38		1296	4.52		1346	4.80	
1247	4.94		1297	4.52		1347	5.09	
1248	4.76		1298	5.04		1348	5.08	
1249	4.62		1299	4.39		1349	5.31	
<i>By Dam 202</i>			<i>By Dam 207</i>			<i>By Dam 212</i>		
1251	4.11		1301	4.58		1351	5.94	
1252	5.16		1302	4.37		1352	6.71	306
1253	4.53		1303	4.93		1353	5.73	
1254	4.39		1304	4.21		1354	6.49	307
1255	4.73		1305	5.59		1355	5.78	
1256	4.79		1306	4.83		1356	5.11	
1257	4.16		1307	4.84		1357	5.33	
1258	4.47		1308	6.09	309	1358	4.90	
1259	5.82	312	1309	4.91		1359	5.76	
<i>By Dam 203</i>			<i>By Dam 208</i>			<i>By Dam 213</i>		
1261	4.37		1311	4.77		1361	4.72	
1262	4.52		1312	4.82		1362	5.39	
1263	4.84		1313	5.09		1363	5.78	
1264	5.10		1314	6.28	304	1364	4.79	
1265	5.00		1315	5.32		1365	5.23	
1266	5.24		1316	4.90		1366	5.51	
1267	5.29		1317	5.27		1367	5.09	
1268	4.99		1318	4.57		1368	5.59	
1269	4.96		1319	5.72		1369	5.14	
<i>By Dam 204</i>			<i>By Dam 209</i>			<i>By Dam 214</i>		
1271	4.42		1321	5.43		1371	5.07	
1272	5.80		1322	4.75		1372	5.12	
1273	4.99		1323	5.55		1373	5.09	
1274	5.51		1324	5.18		1374	5.43	
1275	4.26		1325	5.64		1375	5.55	
1276	5.90	310	1326	4.97		1376	5.55	
1277	4.80		1327	5.22		1377	5.14	
1278	4.87		1328	4.84		1378	5.77	
1279	5.02		1329	4.68		1379	5.89	311
<i>By Dam 205</i>			<i>By Dam 210</i>			<i>By Dam 215</i>		
1281	5.21		1331	5.05		1381	5.29	
1282	5.87		1332	4.73		1382	4.70	
1283	5.23		1333	5.02		1383	5.00	
1284	5.44		1334	5.55		1384	5.69	
1285	4.50		1335	4.59		1385	5.81	
1286	5.21		1336	5.68		1386	5.77	
1287	4.85		1337	5.54		1387	5.07	
1288	5.18		1338	6.08	303	1388	5.06	
1289	5.26		1339	5.00		1389	6.47	305

TABLE 59.—Continued

Annual car No.	Oil, percent.	Register No. assigned.	Annual car No.	Oil, percent.	Register No. assigned.	Annual car No.	Oil, percent.	Register No. assigned.
<i>By Dam 216</i>			<i>By Dam 219</i>			<i>By Dam 222</i>		
1391	5.55		1421	4.87		1451	4.44	
1392	4.98		1422	5.05		1452	4.66	
1393	5.23		1423	4.54		1453	4.94	
1394	5.29		1424	4.99		1454	4.99	
1395	4.65		1425	4.97		1455	5.63	
1396	5.41		1426	4.87		1456	4.99	
1397	5.33		1427	5.54		1457	4.80	
1398	5.28		1428	5.10		1458	5.43	
1399	4.96		1429	4.61		1459	5.22	
<i>By Dam 217</i>			<i>By Dam 220</i>			<i>By Dam 223</i>		
1401	5.26		1431	4.88		1461	4.58	
1402	4.75		1432	4.63		1462	4.48	
1403	5.62		1433	4.47		1463	5.10	
1404	5.58		1434	4.46		1464	4.97	
1405	5.24		1435	5.10		1465	5.63	
1406	5.74		1436	4.76		1466	4.98	
1407	5.54		1437	4.90		1467	5.69	
1408	5.66		1438	4.69		1468	5.08	
1409	5.52		1439	5.23		1469	4.48	
<i>By Dam 218</i>			<i>By Dam 221</i>			<i>By Dam 224</i>		
1411	5.26		1441	4.75		1471	5.17	
1412	4.81		1442	5.05		1472	4.61	
1413	5.83	301	1443	4.81		1473	4.51	
1414	4.94		1444	5.28		1474	5.72	
1415	5.34		1445	4.87		1475	4.99	
1416	5.33		1446	5.07		1476	6.34	308
1417	4.85		1447	5.11		1477	5.12	
1418	4.84		1448	4.79		1478	4.91	
1419	4.59		1449	4.18		1479	5.32	

TABLE 60.—THIRD GENERATION HIGH OIL PLOT RECORD 1899

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar-vested.			Seed ear planted.	Crophar-vested.
301	218	5.83	5.49	307	212	6.49	5.95
302	211	5.90	5.68	308	224	6.34	5.61
303	210	6.08	5.82	309	207	6.09	5.48
304	208	6.28	5.62	310	204	5.90	5.53
305	215	6.47	5.94	311	214	5.89	5.47
306	212	6.71	5.66	312	202	5.82	5.40
Average of plot						6.15	5.64

TABLE 61.—OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1899

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 301</i>			<i>By Dam 305</i>			<i>By Dam 309</i>		
2001	5.07		2041	5.21		2081	5.07	
2002	5.28		2042	5.24		2082	5.43	
2003	5.52		2043	6.21	402	2083	5.31	
2004	5.07		2044	5.38		2084	5.67	
2005	5.50		2045	6.20	411	2085	6.22	410
2006	5.61		2046	5.63		2086	5.59	
2007	6.42	405	2047	6.34		2087	5.23	
2008	5.91		2048	5.87		2088	5.13	
2009	5.73		2049	5.65		2089	6.09	
<i>By Dam 302</i>			<i>By Dam 306</i>			<i>By Dam 310</i>		
2011	5.35		2051	5.84		2091	5.94	
2012	6.11		2052	5.85		2092	6.12	
2013	5.71		2053	5.76		2093	5.49	
2014	5.77		2054	5.43		2094	6.15	
2015	5.34		2055	5.77		2095	5.17	
2016	5.10		2056	5.96		2096	5.90	
2017	5.74		2057	6.18	401	2097	5.39	
2018	4.30		2058	6.16		2098	5.48	
2019	6.01		2059	5.63		2099	5.56	
<i>By Dam 303</i>			<i>By Dam 307</i>			<i>By Dam 311</i>		
2021	5.65		2061	5.80		2101	4.89	
2022	6.09		2062	5.87		2102	6.33	408
2023	5.85		2063	5.50		2103	6.35	404
2024	6.27	409	2064	5.90		2104	6.10	
2025	5.54		2065	5.38		2105	5.38	
2026	6.02		2066	5.46		2106	5.69	
2027	6.43	407	2067	5.83		2107	4.74	
2028	5.70		2068	6.18	412	2108	5.24	
2029	5.37		2069	6.06		2109	6.02	
<i>By Dam 304</i>			<i>By Dam 308</i>			<i>By Dam 312</i>		
2031	5.31		2071	5.35		2111	4.96	
2032	5.91		2072	5.84		2112	5.86	
2033	5.26		2073	6.22	403	2113	5.40	
2034	6.54	406	2074	4.84		2114	5.11	
2035	5.84		2075	5.82		2115	4.93	
2036	5.97		2076	5.53		2116	5.61	
2037	5.06		2077	6.08		2117	5.00	
2038	5.39		2078	5.40		2118	5.28	
2039	5.56		2079	5.32		2119	6.04	

TABLE 62.—FOURTH GENERATION HIGH OIL PLOT RECORD 1900

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar-vested			Seed ear planted.	Crophar-vested.
401	306	6.18	5.93	407	303	6.43	5.92
402	305	6.21	6.29	408	311	6.33	6.29
403	308	6.22	6.04	409	303	6.27	5.92
404	311	6.35	6.16	410	309	6.22	5.91
405	301	6.42	6.17	411	305	6.20	6.27
406	304	6.54	6.30	412	307	6.18	6.24
Average of plot						6.30	6.12

TABLE 63.—OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1900

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 401</i>			<i>By Dam 405</i>			<i>By Dam 409</i>		
3201	5.63		3241	6.30		3281	5.32	
3202	5.71		3242	5.68		3282	6.34	
3203	6.61	513	3243	5.78		3283	5.66	
3204	5.31		3244	6.57		3284	6.57	
3205	6.30		3245	5.97		3285	5.81	
3206	6.77	505	3246	6.05		3286	6.31	
3207	6.18		3247	6.51		3287	5.41	
3208	5.58		3248	6.74	510	3288	6.20	
3209	5.94		3249	6.29		3289	5.44	
<i>By Dam 402</i>			<i>By Dam 406</i>			<i>By Dam 410</i>		
3211	6.18		3251	5.43		3291	6.67	512
3212	6.46		3252	6.14		3292	6.47	
3213	6.60		3253	6.22		3293	5.30	
3214	6.03		3254	5.43		3294	5.78	
3215	5.67		3255	6.37		3295	6.74	504
3216	6.14		3256	6.33		3296	4.60	
3217	6.23		3257	6.51		3297	6.02	
3218	6.64	502	3258	6.58	501	3298	5.60	
3219	6.38		3259	6.26		3299	6.13	
<i>By Dam 403</i>			<i>By Dam 407</i>			<i>By Dam 411</i>		
3221	5.72		3261	5.63		3301	5.51	
3222	6.15		3262	6.73	511	3302	6.03	
3223	5.51		3263	5.46		3303	6.58	514
3224	6.29		3264	6.91	508	3304	6.79	509
3225	6.10		3265	5.82		3305	6.31	
3226	5.70		3266	5.94		3306	5.71	
3227	6.88	506	3267	5.76		3307	5.80	
3228	5.08		3268	5.60		3308	5.98	
3229	5.94		3269	6.39		3309	5.95	
<i>By Dam 404</i>			<i>By Dam 408</i>			<i>By Dam 412</i>		
3231	6.29		3271	6.25		3311	5.81	
3232	6.16		3272	6.44		3312	6.29	
3233	6.26		3273	6.31		3313	6.32	
3234	5.99		3274	5.85		3314	6.73	503
3235	7.40	507	3275	6.41		3315	6.38	
3236	5.84		3276	6.24		3316	5.70	
3237	6.09		3277	6.14		3317	5.96	
3238	6.07		3278	6.14		3318	6.28	
3239	6.53		3279	6.27		3319	6.45	

TABLE 64.—FIFTH GENERATION HIGH OIL PLOT RECORD 1901

[illegible]

TABLE 65.—OIL IN ONE HUNDRED TWENTY SIX INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1901

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 501</i>			<i>By Dam 505</i>			<i>By Dam 510</i>		
3891	6.55		3931	5.59		3981	5.94	
3892	6.58		3932	6.53		3982	5.37	
3893	5.68		3933	6.55		3983	5.61	
3894	4.92		3934	5.68		3984	5.61	
3895	5.77		3935	6.64		3985	6.22	
3896	6.26		3936	6.75		3986	6.20	
3897	6.01		3937	6.48		3987	6.66	
3898	6.35		3938	5.92		3988	5.92	
3899	5.56		3939	5.81		3989	5.59	
<i>By Dam 502</i>			<i>By Dam 506</i>			<i>By Dam 511</i>		
3901	5.96		3941	6.56		3991	6.57	
3902	5.72		3942	6.02		3992	6.78	601
3903	6.08		3943	6.62		3993	6.17	
3904	6.27		3944	6.62		3994	6.51	
3905	6.61		3945	6.20		3995	6.74	
3906	6.55		3946	5.97		3996	6.68	
3907	6.14		3947	5.43		3997	6.07	
3908	6.09		3948	6.43		3998	7.05	605
3909	6.44		3949	5.95		3999	5.34	
<i>By Dam 503</i>			<i>By Dam 507</i>			<i>By Dam 512</i>		
3911	6.25		3951	6.67		4001	6.24	
3912	6.05		3952	7.03	610	4002	6.83	602
3913	5.69		3953	6.51		4003	6.85	612
3914	5.92		3954	6.57		4004	6.52	
3915	6.25		3955	6.60		4005	7.01	604
3916	6.53		3956	6.50		4006	6.61	
3917	5.27		3957	5.98		4007	6.36	
3918	6.09		3958	6.18		4008	6.43	
3919	7.09	606	3959	6.87	603	4009	5.92	
<i>By Dam 504</i>			<i>By Dam 508</i>			<i>By Dam 513</i>		
3921	6.53		3961	6.66		4011	6.01	
3922	6.63		3962	5.89		4012	6.62	
3923	7.13	607	3963	7.10	608	4013	5.12	
3924	6.52		3964	6.14		4014	5.61	
3925	6.16		3965	5.90		4015	6.24	
3926	6.49		3966	6.61		4016	6.08	
3927	5.66		3967	7.07	609	4017	5.90	
3928	6.31		3968	6.08		4018	6.35	
3929	6.50		3969	6.00		4019	5.74	
			<i>By Dam 509</i>			<i>By Dam 514</i>		
			3971	6.64		4021	5.88	
			3972	6.19		4022	5.89	
			3973	6.14		4023	5.78	
			3974	6.55		4024	5.84	
			3975	6.81	613	4025	6.46	
			3976	6.72	614	4026	5.83	
			3977	7.00	611	4027	5.87	
			3978	6.26		4028	6.46	
			3979	6.01		4029	5.74	

TABLE 66.—SIXTH GENERATION HIGH OIL PLOT RECORD 1902

[illegible]

TABLE 67.—OIL IN NINETY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1902

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 602</i>			<i>By Dam 607</i>			<i>By Dam 612</i>		
4371	5.82		4401	5.98		4441	7.37	711
4372	6.50	703	4402	6.09		4442	5.82	
4373	6.15		4403	7.00		4443	6.40	
4374	7.04	710	4404	7.08		4444	6.27	
4375	5.43		4405	6.38		4445	6.28	
4376	6.50	720	4406	5.85		4446	5.11	
4377	6.04		4407	6.68		4447	5.67	
4378	5.76		4408	6.77		4448	6.78	716
4379	6.44		4409	6.62		4449	6.36	
<i>By Dam 604</i>			<i>By Dam 609</i>			<i>By Dam 613</i>		
4381	6.94		4411	7.00	709	4451	6.34	
4382	6.41	722	4412	6.87	715	4452	5.95	
4383	5.29		4413	6.65	718	4453	5.86	
4384	6.21		4414	6.85	707	4454	5.86	
4385	6.68	705	4415	6.70	717	4455	6.06	
4386	5.30		4416	6.31		4456	6.43	701
4387	6.38		4417	7.00	714	4457	6.10	
4388	5.66		4418	5.35		4458	6.21	
4389	6.56	704	4419	6.36		4459	5.83	
<i>By Dam 606</i>			<i>By Dam 610</i>			<i>By Dam 614</i>		
4391	5.14		4421	7.02	713	4461	5.59	
4392	5.50		4422	6.50	702	4462	6.74	706
4393	5.74		4423	6.94	708	4463	6.00	
4394	5.04		4424	6.67		4464	6.28	
4395	6.40		4425	6.61		4465	5.92	
4396	6.08		4426	6.11		4466	6.56	719
4397	6.26		4427	6.69		4467	5.98	
4398	5.17		4428	6.13		4468	5.67	
4399	6.14		4429	6.27		4469	6.00	
			<i>By Dam 611</i>					
			4431	6.50	721			
			4432	6.77				
			4433	6.67				
			4434	6.17				
			4435	6.22				
			4436	7.17	712			
			4437	6.92				
			4438	6.13				
			4439	6.45				

TEN GENERATIONS OF CORN BREEDING.

TABLE 68.—SEVENTH GENERATION HIGH OIL PLOT RECORD 1903

[illegible]

TABLE 69.—OIL IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1903

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 701</i>			<i>By Dam 710</i>			<i>By Dam 718</i>		
1	6.20		31	6.81		71	6.28	
2	6.35		32	6.97	804	72	5.73	
3	6.23		33	6.19		73	6.25	
4	6.44		34	6.99	818	74	6.23	
5	6.09		35	6.72		75	6.82	801
6	6.04		36	6.50		76	6.51	
7	5.75		37	6.60		77	6.09	
8	6.35		38	6.95	820	78	6.82	
9	6.73		39	7.10	807	79	7.02	805
10	6.84		40	6.63		80	5.63	
<i>By Dam 702</i>			<i>By Dam 713</i>			<i>By Dam 719</i>		
11	5.88		41	7.41	813	81	6.53	
12	6.20		42	6.98	819	82	5.90	
13	5.70		43	7.71	811	83	6.65	
14	6.39		44	6.56		84	6.43	
15	7.08	816	45	7.31	809	85	5.83	
16	6.37		46	6.61		86	6.26	
17	6.13		47	7.16	815	87	6.33	
18	6.49		48	7.06	806	88	6.16	
19	6.59		49	6.46		89	6.62	
20	5.92		50	6.94	803	90	6.41	
<i>By Dam 709</i>			<i>By Dam 715</i>			<i>By Dam 721</i>		
21	6.68		51	6.90	821	91	6.37	
22	6.34		52	6.33		92	6.70	
23	7.33	810	53	7.05	817	93	6.94	
24	6.68		54	7.27	808	94	6.66	
25	7.56	812	55	5.74		95	5.65	
26	6.37		56	6.51		96	5.84	
27	6.47		57	5.69		97	5.96	
28	6.78		58	6.12		98	6.64	
29	6.69		59	6.77		99	6.81	822
30	7.29	814	60	6.78		100	6.73	
			<i>By Dam 717</i>					
			61	6.60				
			62	6.90	802			
			63	6.70				
			64	5.80				
			65	6.35				
			66	6.76				
			67	6.09				
			68	5.96				
			69	6.44				
			70	5.52				

TABLE 70.—EIGHTH GENERATION HIGH OIL PLOT RECORD 1904

[illegible]

TABLE 71.—OIL IN ONE HUNDRED ONE INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1904

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 802</i>			<i>By Dam 810</i>			<i>By Dam 816</i>		
1	7.73	912	31	7.53		71	8.44	908
2	6.62		32	7.31		72	6.82	
3	7.36		33	6.88		73	8.03	915
4	7.55	901	34	7.72	909	74	7.24	
5	7.39		35	7.63	914	75	6.94	
6	7.10		36	6.86		76	7.68	
7	7.33		37	7.43		77	8.30	918
8	7.22		38	7.41		78	7.54	
9	6.87		39	6.88		79	7.52	
10	4.88		40	7.62	925	80	7.14	
<i>By Dam 804</i>			<i>By Dam 812</i>			<i>By Dam 818</i>		
11	7.00		41	6.68		81	7.39	
12	7.36		42	6.27		82	7.41	910
13	7.02		43	8.09	917	83	6.54	
14	7.43		44	7.69	922	84	7.28	923
15	6.29		45	7.58	907	85	7.03	
16	6.29		46	6.31		86	7.68	
17	7.57	913	47	6.25		87	7.10	
18	7.99	920	48	6.87		88	7.22	
19	6.74		49	7.20		89	7.24	
20	7.44		50	7.23		90	7.26	
<i>By Dam 808</i>			<i>By Dam 813</i>			<i>By Dam 822</i>		
21	7.09		51	6.75		91	6.02	
22	7.95	904	52	6.78		92	6.51	
23	6.94		53	6.89		93	6.18	
24	7.03		54	7.50	919	94	6.62	
25	7.32		55	7.17		95	6.60	
26	7.37	911	56	7.70	906	96	6.37	
27	6.95		57	6.84		97	6.35	
28	6.54		58	7.49	924	98	5.97	
29	6.81		59	7.43		99	6.21	
30	7.32		60	6.87		100	7.13	905
			<i>By Dam 814</i>			101	7.56	902
			61	7.05				
			62	6.81				
			63	7.92	921			
			64	8.14	916			
			65	7.82				
			66	6.47				
			67	6.82				
			68	6.60				
			69	6.38				
			70	7.94	903			

TABLE 72.—NINTH GENERATION HIGH OIL PLOT RECORD 1905

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crop harvested.			Seed ear planted.	Crop harvested.
901	802	7.55	6.98	914	810	7.63	7.11
902	822	7.56		915	816	8.03	
903	814	7.94		916	814	8.14	
904	808	7.95	7.55	917	812	8.09	7.68
905	822	7.13		918	816	8.30	
906	813	7.70	919	813	7.50	7.12	
907	812	7.58	920	804	7.99		
908	816	8.44	921	814	7.92		
909	810	7.72	7.30	922	812	7.69	7.29
910	818	7.41		923	818	7.28	
911	808	7.37		924	813	7.49	
912	802	7.73		925	810	7.62	
913	804	7.57					
Average of six selected rows						7.88	7.29

TABLE 73.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM
HIGH-OIL PLOT OF 1905

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
By Dam 902			By Dam 910			By Dam 918			
1	6.67	1002	41	7.28	1011	81	7.78	1010	
2	6.40		42	7.36		82	7.02		
3	8.38		43	6.27		83	8.57		
4	6.32		44	6.59		84	7.73		
5	7.24		45	6.28		85	7.74		
6	6.43		46	7.02		86	7.41		
7	6.71		47	7.44		87	7.46		
8	7.12		48	6.63		88	7.12		
9	6.73		49	7.84		89	7.49		
10	6.68	1014	50	7.86	1006	90	8.59	1022	
11	6.84		51	7.18	1023	91	7.51		
12	7.57		52	7.83		92	7.50		
13	6.55		53	7.68		93	7.81		
14	6.76		54	7.18		94	7.57		
15	7.56		55	7.77		95	7.87		
16	6.84		56	7.69		96	7.79		
17	6.79		57	7.10		97	7.89		1003
18	7.21		58	6.87		98	8.00			1015
19	7.46	59	8.24	99	7.39				
20	7.30	1019	60	7.87	1018	100	7.30		
By Dam 904			By Dam 916			By Dam 920			
21	7.35	1004	61	7.18	1008	101	7.15	1017	
22	6.58		62	7.65		102	6.69		
23	7.90		63	6.88		103	6.93		
24	7.20		64	6.39		104	7.20		
25	7.32		65	7.65		105	7.35		
26	7.33		66	8.00		106	7.02		
27	8.33		67	7.02		107	6.38		
28	7.65		68	6.70		108	7.91		
29	7.53		69	6.27		109	8.17		1012
30	6.76	70	6.58	110	7.38	1005			
31	8.02	71	7.31	111	6.95		1024		
32	8.25	72	7.44	112	6.53				
33	6.79	73	6.67	113	7.76				
34	8.33	74	7.15	114	7.20				
35	6.66	75	7.38	115	6.97				
36	7.58	76	7.04	116	7.06				
37	7.71	77	7.76	117	6.95				
38	7.98	78	6.82	118	7.14				
39	7.26	1016	79	6.74	119	6.76			
40	8.50		80	7.53	1013	120	6.87		

TABLE 74.—TENTH GENERATION HIGH OIL PLOT RECORD 1906

[illegible]

TABLE 75.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1906

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 1008</i>			<i>By Dam 1014</i>			<i>By Dam 1020</i>		
1	7.70		41	6.98		81	6.77	
2	7.29		42	7.89	1111	82	7.62	1103
3	7.44		43	7.47		83	7.30	
4	7.31		44	8.02	1123	84	6.89	
5	7.37		45	7.85		85	7.45	
6	7.01		46	7.72		86	7.14	
7	6.94		47	8.23	1106	87	7.10	
8	7.72	1107	48	7.58		88	7.90	1110
9	7.55		49	7.45		89	7.33	
10	7.02		50	6.88		90	7.26	
11	7.81	1119	51	7.63		91	6.62	
12	7.69		52	7.66		92	7.49	
13	7.42		53	7.64		93	6.56	
14	7.42		54	6.93		94	7.86	1122
15	6.87		55	6.67		95	7.48	
16	7.47		56	7.62		96	6.90	
17	7.82	1102	57	6.87		97	7.42	
18	7.30		58	7.47		98	7.41	
19	7.58		59	7.09		99	6.57	
20	7.87	1114	60	8.39	1118	100	7.53	1115
<i>By Dam 1010</i>			<i>By Dam 1018</i>			<i>By Dam 1024</i>		
21	7.14		61	7.16	1101	101	7.97	1105
22	7.47		62	6.59		102	7.52	
23	7.08		63	7.11	1113	103	7.39	
24	7.73		64	6.71		104	7.59	
25	7.92	1109	65	7.43		105	7.33	
26	7.04		66	6.73		106	7.67	
27	7.84		67	6.86		107	7.13	
28	6.99		68	7.61	1108	108	7.05	
29	7.44		69	7.05		109	8.01	1112
30	7.47		70	6.96		110	7.61	
31	6.92		71	8.33	1120	111	7.46	
32	7.05		72	6.57		112	7.22	
33	7.94	1121	73	7.02		113	7.76	
34	7.31		74	6.11		114	8.46	1124
35	7.28		75	6.88		115	7.60	
36	7.75		76	6.66		116	7.56	
37	8.51	1104	77	6.95		117	7.87	1117
38	8.05	1116	78	6.68		118	7.82	
39	7.61		79	6.88		119	7.87	
40	7.34		80	6.94		120	7.61	

TABLE 76.—FIRST GENERATION LOW OIL PLOT RECORD 1897

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar-vested.			Seed ear planted.	Crophar-vested.
101		4.08		107		3.94	4.01
102		4.09	3.96	108		4.01	4.06
103		4.03	4.21	109		4.12	3.97
104		4.07	4.31	110		4.10	4.05
105		3.95	4.05	111		4.12	4.22
106		3.84	3.79	112		4.14	
Average of ten rows harvested						4.03	4.06

TABLE 77.—OIL IN FORTY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1897

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 102</i>			<i>By Dam 105</i>			<i>By Dam 109</i>		
571	4.00		586	4.21		606	3.50	208
572	3.96		587	4.74		607	4.40	
573	3.89		588	3.70	209	608	3.90	
574	3.83	202	589	3.85	201	609	3.90	
<i>By Dam 103</i>			<i>By Dam 106</i>			<i>By Dam 110</i>		
576	4.21		591	3.85	212	611	3.84	211
577	4.28		592	3.72	203	612	4.08	
578	4.18		593	3.38	207	613	4.39	
579	4.41		594	3.39	205	614	3.39	206
<i>By Dam 104</i>			<i>By Dam 107</i>			<i>By Dam 111</i>		
581	4.74		596	4.21		616	4.08	
582	4.69		597	4.22		617	4.19	
583	4.65		598	4.42		618	4.43	
584	4.07		599	4.04		619	4.68	
			<i>By Dam 108</i>					
			601	4.68				
			602	3.55	204			
			603	3.80	210			
			604	4.42				

TABLE 78.—SECOND GENERATION LOW OIL PLOT RECORD 1898

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar. vested.			Seed ear planted.	Crophar. vested.
201	105	3.85	3.97	207	106	3.38	3.69
202	102	3.83	4.32	208	109	3.50	3.78
203	106	3.72	4.08	209	105	3.70	3.93
204	108	3.55	3.99	210	108	3.80	4.18
205	106	3.39	3.81	211	110	3.84	4.21
206	110	3.39	3.81	212	106	3.85	4.11
Average of plot						3.65	3.99

TABLE 79.—OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1898

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 201</i>			<i>By Dam 205</i>			<i>By Dam 209</i>		
1481	4.11		1521	3.64	301	1561	3.68	
1482	3.88		1522	3.27	309	1562	3.73	
1483	3.91		1523	4.10		1563	4.24	
1484	4.02		1524	3.72		1564	3.58	303
1485	4.29		1525	3.89		1565	3.92	
1486	3.39	312	1526	4.02		1566	3.72	
1487	3.76		1527	4.07		1567	4.00	
1488	4.02		1528	3.90		1568	3.67	
1489	4.02		1529	3.22	308	1569	4.25	
<i>By Dam 202</i>			<i>By Dam 206</i>			<i>By Dam 210</i>		
1491	4.27		1531	3.33	310	1571	4.01	
1492	4.60		1532	3.67		1572	4.09	
1493	3.81		1533	3.86		1573	4.11	
1494	4.12		1534	3.67		1574	4.26	
1495	4.19		1535	4.34		1575	4.45	
1496	4.27		1536	3.85		1576	4.19	
1497	4.37		1537	3.50		1577	4.29	
1498	4.52		1538	3.56	304	1578	3.80	
1499	3.82		1539	3.34	306	1579	3.80	
<i>By Dam 203</i>			<i>By Dam 207</i>			<i>By Dam 211</i>		
1501	4.55		1541	3.83		1581	4.35	
1502	4.02		1542	4.11		1582	3.82	
1503	4.25		1543	3.59	314	1583	4.22	
1504	3.38	305	1544	3.66		1584	4.50	
1505	3.77		1545	3.35	311	1585	4.61	
1506	4.35		1546	3.63		1586	4.06	
1507	4.17		1547	3.64		1587	3.75	
1508	4.08		1548	3.65	316	1588	4.39	
1509	3.95		1549	3.72		1589	4.45	
<i>By Dam 204</i>			<i>By Dam 208</i>			<i>By Dam 212</i>		
1511	3.98		1551	3.89		1591	3.95	
1512	3.64	315	1552	3.87		1592	4.34	
1513	4.20		1553	3.86		1593	4.17	
1514	4.01		1554	3.79		1594	4.77	
1515	4.10		1555	3.93		1595	4.17	
1516	3.32	307	1556	3.64		1596	3.99	
1517	3.65		1557	3.56	313	1597	3.85	
1518	4.26		1558	3.80		1598	4.40	
1519	4.03		1559	3.63	302	1599	3.98	

[illegible]

TABLE 81.—OIL IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1899

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
By Dam 301			By Dam 306			By Dam 312			
2121	3.89	404	2171	3.55	414	2231	4.03	412	
2122	3.45		2172	3.57		2232	3.65		
2123	3.82		2173	3.46		2233	4.29		
2124	3.91		2174	3.76		2234	3.55		
2125	4.09		2175	3.91		2235	3.41		
2126	3.93		2176	3.60		2236	4.03		
2127	3.56		2177	3.90		2237	3.72		
2128	4.12		2178	4.16		2238	4.10		
2129	3.68		2179	3.79		2239	3.42		405
By Dam 302			By Dam 307			By Dam 313			
2131	3.79	401	2181	2.94	409	2241	4.21	413	
2132	4.17		2182	3.53	410	2242	3.63		
2133	3.62		2183	3.14		2243	3.47		
2134	3.82		2184	3.22		2244	3.81		
2135	4.24		2185	3.58		2245	3.99		
2136	3.54		2186	3.69		2246	4.32		
2137	3.74		2187	3.71		2247	3.95		
2138	4.12		2188	3.60		2248	3.98		
2139	4.20		2189	3.51		2249	3.96		
By Dam 303			By Dam 308			By Dam 314			
2141	3.53	402	2191	4.38	403	2251	3.90	408	
2142	4.50		2192	3.93		2252	3.71		
2143	4.21		2193	4.18		2253	3.56		
2144	3.87		2194	4.13		2254	3.68		
2145	4.10		2195	3.87		2255	2.81		
2146	3.55		2196	4.38		2256	4.13		
2147	3.89		2197	4.21		2257	3.84		
2148	3.94		2198	3.92		2258	4.48		
2149	3.65		2199	3.46		2259	3.60		
By Dam 304			By Dam 309			By Dam 315			
2151	3.62		2201	3.73	416	2261	4.11	415	
2152	3.96		2202	4.00		2262	4.25		
2153	3.83		2203	3.52		2263	3.93		
2154	3.62		2204	3.69		2264	3.67		
2155	4.57		2205	3.57		2265	3.60		
2156	3.82		2206	3.69		2266	3.49		
2157	3.76		2207	3.95		2267	4.28		
2158	3.89		2208	3.81		2268	3.84		
2159	4.19		2209	3.84		2269	3.76		
By Dam 305			By Dam 310			By Dam 316			
2161	3.68		2211	3.68	407	2271	4.13		
2162	4.04		2212	4.26		2272	3.72		
2163	3.66		2213	4.45		2273	3.71		
2164	4.38		2214	3.08		2274	4.22		
2165	4.16		2215	3.58		2275	3.97		
2166	4.08		2216	3.33		2276	3.78		
2167	4.72		2217	3.60		2277	4.14		
2168	4.35		2218	3.93		2278	3.92		
2169	3.86		2219	3.32		411	2279		3.59
			By Dam 311						
			2221	3.31	406				
			2222	4.00					
			2223	3.82					
			2224	4.36					
			2225	3.73					
			2226	3.98					
			2227	3.75					
			2228	4.41					
			2229	3.92					

TABLE 83.—OIL IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1900

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
By Dam 401			By Dam 406			By Dam 411		
3321	4.35	501	3371	3.35	512	3421	3.50	
3322	3.55		3372	3.42		3422	3.59	
3323	4.05		3373	3.03		3423	3.56	
3324	3.16		3374	3.35		3424	3.24	
3325	3.32		3375	3.54		3425	3.86	
3326	3.42		3376	3.03	3426	3.59		
3327	3.69		3377	3.32	3427	3.90		
3328	4.43		3378	3.65	3428	3.46		
3329	3.68		3379	3.55	3429	3.63		
By Dam 402			By Dam 407			By Dam 412		
3331	3.49		3381	3.76	504	3431	3.55	
3332	3.70		3382	3.34		3432	3.89	
3333	3.44		3383	3.66		3433	3.38	
3334	3.61		3384	3.27		3434	3.77	
3335	3.64		3385	3.55		3435	3.24	
3336	3.26		3386	3.23		3336	3.36	
3337	4.08		3387	3.31		3437	3.71	
3338	4.30		3388	3.28		3438	3.82	
3339	3.23		3389	2.97		3439	3.75	
By Dam 403			By Dam 408			By Dam 413		
3341	3.26		3391	2.94	510	3441	3.30	
3342	3.74		3392	3.49		3442	3.73	
3343	3.26		3393	3.43		3443	3.93	
3344	3.37		3394	3.37		3444	3.83	
3345	3.94		3395	2.56	507	3445	4.01	
3346	3.82		3396	3.20		3446	3.95	
3347	3.46		3397	3.66		3447	3.68	
3348	3.44		3398	4.03		3448	4.04	
3349	3.45		3399	3.41		5449	3.22		514
By Dam 404			By Dam 409			By Dam 414		
3351	3.31	513	3401	3.68	508	3451	3.56	
3352	3.90		3402	3.81		3452	3.58	
3353	3.27		3403	2.65		3453	3.50	
3354	3.35		3404	3.49		3454	3.89	
3355	3.09		3405	3.54		3455	3.94	
3356	3.54		3406	3.50	3456	3.32		
3357	3.25		3407	3.37	3457	4.31		
3358	3.43		3408	2.65	3458	4.17		
3359	3.86		3409	3.51	3459	3.78		
By Dam 405			By Dam 410			By Dam 415		
3361	4.52		3411	4.19	505	3461	3.71	
3362	3.96		3412	2.89		3462	3.36	
3363	4.06		3413	3.75		3463	3.68	
3364	4.05		3414	3.47		3464	4.05	
3365	4.07		3415	3.20		3465	3.39	
3366	4.02		3416	3.47	3466	4.14		
3367	3.62		3417	3.02	503	3467	3.81	
3368	4.01		3418	3.44		3468	3.31	
3369	4.45		3419	3.59		3469	3.55	

TABLE 85.—OIL IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1901

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 501</i>			<i>By Dam 505</i>			<i>By Dam 510</i>		
4031	3.31		4071	3.60		4121	3.60	
4032	3.96		4072	3.75		4122	3.25	
4033	3.19		4073	3.57		4123	3.29	
4034	3.32		4074	3.77		4124	3.41	
4035	3.53		4075	3.37		4125	3.42	
4036	3.31		4076	3.36		4126	3.42	
4037	3.90		4077	3.72		4127	3.65	
4038	3.35		4078	3.45		4128	3.58	
4039	3.34		4079	3.56		4129	3.54	
<i>By Dam 502</i>			<i>By Dam 506</i>			<i>By Dam 511</i>		
4041	3.57		4081	3.18		4131	3.47	
4042	3.42		4082	3.75		4132	3.00	604
4043	3.26		4083	3.50		4133	3.45	
4044	3.09	613	4084	3.52		4134	3.11	
4045	3.29		4085	3.29		4135	3.23	
4046	3.81		4086	2.78	607	4136	3.38	
4047	3.65		4087	3.17		4137	3.44	
4048	3.16	614	4088	3.56		4138	3.40	
4049	3.77		4089	3.80		4139	3.66	
<i>By Dam 503</i>			<i>By Dam 507</i>			<i>By Dam 512</i>		
4051	3.06	603	4091	3.21		4141	3.32	
4052	3.93		4092	3.08	602	4142	2.93	606
4053	3.60		4093	3.88		4143	3.44	
4054	3.69		4094	3.70		4144	3.68	
4055	3.42		4095	3.24		4145	3.03	611
4056	3.52		4096	3.35		4146	3.62	
4057	3.53		4097	3.22		4147	3.83	
4058	3.57		4098	3.07	612	4148	3.62	
4059	3.32		4099	3.26		4149	3.39	
<i>By Dam 504</i>			<i>By Dam 508</i>			<i>By Dam 513</i>		
4061	2.96	605	4101	2.95	609	4151	3.56	
4062	3.66		4102	3.33		4152	4.17	
4063	2.97	610	4103	3.82		4153	3.78	
4064	3.62		4104	3.40		4154	3.28	
4065	3.34		4105	3.35		4155	3.53	
4066	3.36		4106	3.47		4156	3.37	
4067	3.22		4107	3.47		4157	3.65	
4068	3.78		4108	3.18		4158	3.66	
4069	3.47		4109	3.20		4159	2.97	
			<i>By Dam 509</i>			<i>By Dam 514</i>		
			4111	3.73		4161	3.40	
			4112	3.17		4162	3.73	
			4113	3.38		4163	4.09	
			4114	3.61		4164	3.64	
			4115	3.49		4165	3.69	
			4116	3.77		4166	2.87	608
			4117	3.63		4167	3.38	
			4118	3.10	601	4168	3.87	
			4119	3.64		4169	3.55	

TABLE 86.—SIXTH GENERATION LOW OIL PLOT RECORD 1902

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar vested.			Seed ear planted.	Crophar vested.
601	509	3.10		608	514	2.87	
602	507	3.08	3.16	609	508	2.95	3.03
603	503	3.06	3.18	610	504	2.97	
604	511	3.00	2.92	611	512	3.03	2.84
605	504	2.96	2.86	612	507	3.07	3.01
606	512	2.93	3.02	613	502	3.09	
607	506	2.78	2.80	614	502	3.16	3.32
Average of ten selected rows						3.00	3.02

TABLE 87.—OIL IN NINETY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1902

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 602</i>			<i>By Dam 605</i>			<i>By Dam 611</i>		
4471	3.32	718	4501	2.83	717	4541	3.17	709
4472	2.80		4502	2.66		4542	2.85	
4473	3.55		4503	3.21		4543	3.21	
4474	2.67		4504	3.03		4544	2.87	
4475	3.37		4505	2.75	721	4545	2.83	
4476	3.41		4506	2.78	701	4546	2.79	
4477	3.08		4507	2.81		4547	2.80	
4478	3.04		4508	2.83		4548	2.54	
4479	3.28		4509	2.52	713	4549	2.87	
<i>By Dam 603</i>			<i>By Dam 606</i>			<i>By Dam 612</i>		
4481	2.94	707	4511	3.06	710	4551	3.53	716 705 706
4482	2.86		4512	2.44		4552	3.01	
4483	3.16		4513	3.36		4553	2.65	
4484	3.05		4514	2.98		4554	2.66	
4485	3.66		4515	2.79	722	4555	2.65	
4486	2.65		4516	3.16		4556	2.83	
4487	3.39		4517	3.07		4557	3.44	
4488	3.51		4518	2.83		4558	3.12	
4489	3.03		4519	3.23		4559	3.28	
<i>By Dam 604</i>			<i>By Dam 607</i>			<i>By Dam 614</i>		
4491	2.60	708	4521	2.12	711	4561	3.80	702
4492	2.93		4522	3.06		4562	3.56	
4493	3.19		4523	2.93		4563	3.76	
4494	2.78		4524	2.90		4564	3.20	
4495	2.59	714	4525	3.06		4565	3.29	
4496	2.67	704	4526	3.54		4566	3.03	
4497	3.33		4527	2.63	715	4567	3.52	
4498	2.87		4528	2.70	719	4568	2.74	
4499	2.72	703	4529	2.87		4569	3.07	
			<i>By Dam 609</i>					
			4531	3.12	720			
			4532	2.92				
			4533	2.83				
			4534	2.80				
			4535	2.73				
			4536	3.16				
			4537	2.41				
			4538	2.74	712			
			4539	3.65				

TABLE 88.—SEVENTH GENERATION LOW OIL PLOT RECORD 1903

Register ear No.	By Dam No.	Oil, percent.		Register ear No.	By Dam No.	Oil, percent.	
		Seed ear planted.	Crophar- vested.			Seed ear planted.	Crophar- vested.
701	605	2.78		712	609	2.41	2.82
702	614	2.74		713	605	2.52	3.01
703	604	2.72		714	604	2.59	*
704	604	2.67		715	607	2.63	
705	612	2.66		716	612	2.65	3.24
706	612	2.65		717	605	2.66	
707	603	2.65		718	602	2.67	2.81
708	604	2.60	3.04	719	607	2.70	3.01
709	611	2.54	2.82	720	609	2.73	2.93
710	606	2.44		721	605	2.75	
711	607	2.12		722	606	2.79	3.02
Average of nine rows						2.62	2.97

*Sample destroyed

TABLE 89.—OIL IN NINETY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1903

Annual ear No.	Oil; percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
By Dam 708			By Dam 713			By Dam 719			
1	3.26	816	31	3.19	801	71	3.14	821	
2	3.12		32	2.86	807	72	3.18	812	
3	2.92		33	2.82		73	2.66		
4	3.04		34	3.31		74	2.51		
5	2.96		35	3.20		75	2.77	808	
6	2.83		36	3.26		76	3.26		
7	2.95		37	3.21	77	3.47	803		
8	3.04		38	3.12	78	3.31			
9	3.22		39	3.01	79	3.56			
10	2.62		40	3.03	80	3.01			
By Dam 709			By Dam 714			By Dam 720			
11	2.78		41	(Samples spoiled)		81	3.19	822	
12	2.93		42	(No analyses)		82	3.33	805	
13	3.38		43	made		83	2.99		
14	3.10		44			84	2.91		
15	2.93		45			85	2.96	818	
16	2.73		46		86	2.85			
17	3.13		47		87	3.02	802		
18	2.81		48		88	2.71	810		
19	2.68		49		89	2.71			
20	2.89		50		90	3.32			
By Dam 712			By Dam 716			By Dam 722			
21	2.71		51	2.98		91	3.02	804	
22	2.94		52	2.83		92	3.37		
23	2.74		53	2.66		93	3.38		
24	2.85		54	3.39		94	3.06		
25	2.81		55	3.31	95	2.72	813		
26	2.87		56	2.88	96	2.81		819	
27	2.93		57	2.78	814	97	2.33	811	
28	2.84		58	3.18	817	98	2.92	815	
29	3.28		59	3.28		99	2.72	809	
30	3.03		60	2.75		100	2.97		
			By Dam 718						
			61	2.62	806				
			62	2.96					
			63	3.17					
			64	3.21					
			65	2.91					
			66	2.94					
			67	3.00					
			68	2.92					
			69	2.99					
			70	2.86					

[illegible]

TABLE 91.—OIL IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1904

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 804</i>			<i>By Dam 810</i>			<i>By Dam 815</i>		
1	3.10		31	3.09		71*	3.29	
2	3.05		32	2.57		72	2.65	924
3	3.43		33	2.69	912	73	2.47	920
4	3.15		34	3.18		74	2.87	
5	3.30		35	2.97		75	2.78	
6	3.26		36	2.66	921	76	3.28	
7	2.70	906	37	2.94		77	3.14	
8	2.96		38	2.76		78	3.33	
9	3.31		39	2.90		79	2.69	913
10	2.83	911	40	2.90		80	2.99	
<i>By Dam 806</i>			<i>By Dam 811</i>			<i>By Dam 816</i>		
11	2.98		41	2.37		81	3.15	
12	2.82		42	2.78		82	2.95	
13	2.93		43	2.40	902	83	2.95	
14	2.83	901	44	2.79		84	2.63	905
15	2.84	908	45	2.74		85	3.07	
16	2.79		46	2.66		86	3.44	
17	2.84		47	2.67		87	3.07	
18	2.83		48	2.52	914	88	2.74	922
19	3.03		49	2.53		89	2.96	
20	2.69	915	50	2.34	917	90	2.84	
<i>By Dam 807</i>			<i>By Dam 812</i>			<i>By Dam 818</i>		
21	2.83		51	2.93		91	2.69	903
22	2.83		52	2.91		92	2.98	
23	2.94		53	2.86	907	93	3.10	
24	3.02		54	2.96		94	3.17	
25	2.67	904	55	2.74	918	95	2.49	916
26	2.75	910	56	3.10		96	2.65	923
27	2.83		57	2.85		97	3.09	
28	3.03		58	2.93		98	3.00	
29	3.24		59	2.74	925	99	2.80	
30	2.53	919	60	3.02		100	3.15	
			<i>By Dam 814</i>					
			61	3.23				
			62	3.07				
			63	2.67	909			
			64	3.14				
			65	3.41				
			66	3.27				
			67	2.68				
			68	3.47				
			69	2.86				
			70	3.12				

TABLE 92.—NINTH GENERATION LOW OIL PLOT RECORD, 1905

[illegible]

TABLE 93.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1905

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 906</i>			<i>By Dam 910</i>			<i>By Dam 918</i>		
1	2.51		41	2.30	1011	81	2.84	
2	2.93		42	3.04		82	3.02	
3	2.35	1002	43	2.33		83	2.53	
4	2.25		44	2.62		84	2.57	
5	2.78		45	2.41		85	3.06	
6	2.35	1014	46	2.77		86	2.24	1010
7	1.97		47	2.52		87	2.42	1003
8	2.92		48	2.50		88	3.02	
9	2.41	1007	49	2.74		89	3.14	
10	2.75		50	2.10		90	2.37	1015
11	2.56		51	2.43		91	2.50	
12	2.95		52	2.82		92	2.32	1022
13	2.42	1019	53	2.22	1006	93	2.58	
14	2.87		54	1.77	1018	94	2.46	
15	2.89		55	3.09		95	2.71	
16	2.76		56	2.44		96	2.66	
17	2.86		57	2.37		97	2.72	
18	2.43		58	2.31		98	2.96	
19	2.60		59	2.58		99	2.83	
20	2.43		60	2.26	1023	100	2.75	
<i>By Dam 908</i>			<i>By Dam 914</i>			<i>By Dam 920</i>		
21	2.51		61	2.48		101	2.61	
22	2.51		62	2.80		102	2.71	
23	2.94		63	2.73		103	2.99	
24	3.07		64	2.63		104	2.63	
25	2.80		65	2.93		105	2.66	
26	2.58		66	2.24		106	2.31	
27	2.01	1004	67	2.77		107	2.45	1005
28	2.75		68	2.80		108	2.86	
29	2.92		69	2.36	1001	109	2.74	
30	2.52		70	2.56		110	2.80	
31	2.24	1016	71	2.47		111	2.40	1017
32	2.68		72	2.23	1008	112	2.26	1012
33	2.85		73	2.24	1020	113	2.26	
34	2.69		74	2.42		114	2.24	
35	2.45		75	2.64		115	2.50	
36	2.92		76	1.99		116	....	
37	2.43	1009	77	2.67		117	2.89	
38	2.55		78	2.39	1013	118	2.40	1024
39	2.40	1021	79	2.60		119	2.56	
40	2.95		80	2.41		120	2.51	

TABLE 95.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM
LOW-OIL PLOT OF 1906

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
<i>By Dam 1002</i>			<i>By Dam 1014</i>			<i>By Dam 1018</i>		
1	2.88		41	2.96		81	2.26	
2	2.22	1102	42	2.76		82	2.38	
3	2.05	1114	43	2.77		83	2.40	
4	2.70		44	2.66		84	1.60	1110
5	2.88		45	2.82		85	2.43	
6	2.69		46	2.05	1106	86	3.17	
7	2.71		47	2.28		87	2.36	
8	2.42	1107	48	3.17		88	2.57	
9	2.98		49	2.87		89	2.35	
10	2.98		50	2.67		90	3.22	
11	2.65	1119	51	2.80		91	2.39	
12	2.88		52	2.97		92	2.98	
13	3.18		53	3.03		93	2.47	
14	3.16		54	2.88		94	2.23	1103
15	3.21		55	2.43	1118	95	2.52	
16	2.93		56	2.43	1111	96	2.41	
17	2.79		57	2.45	1123	97	2.59	
18	2.76		58	2.56		98	2.48	
19	2.77		59	3.10		99	2.34	1115
20	3.00		60	3.54		100	2.10	1122
<i>By Dam 1006</i>			<i>By Dam 1016</i>			<i>By Dam 1020</i>		
21	2.70		61	2.74		101	2.52	
22	2.68		62	2.67		102	2.44	
23	2.40	1109	63	2.79		103	2.35	1105
24	3.01		64	2.87		104	2.60	
25	2.63		65	2.34	1108	105	3.14	
26	2.34	1104	66	2.45		106	2.85	
27	2.49	1121	67	2.62		107	2.21	1112
28	2.86		68	2.72		108	3.15	
29	2.93		69	2.77		109	2.67	
30	3.13		70	2.55		110	2.91	
31	2.82		71	2.91		111	2.50	
32	2.78		72	2.68		112	2.38	1117
33	2.71		73	2.82		113	2.59	
34	2.71		74	2.45	1101	114	2.61	
35	2.72		75	2.97		115	2.45	
36	2.15	1116	76	2.34	1120	116	2.62	
37	2.73		77	2.50		117	2.22	
38	2.53		78	2.54		118	3.28	
39	2.87		79	2.35	1113	119	2.78	
40	3.01		80	2.54		120	2.10	1124

TABLE 96.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT IN 1898

Plot row No.	High protein.			Low protein.		
	Register ear No.	Protein, percent.		Register ear No.	Protein, percent.	
		Seed ear planted.	Crop harvested.		Seed ear planted.	Crop harvested.
1	209	12.80	11.24	205	8.84	9.72
2	212	13.62	11.75	206	8.22	11.04
3	216	12.72	12.10	207	8.29	10.09
4	223	11.97	11.65	208	8.88	10.89
5	224	11.89	11.81	209	9.05	10.58
Plot averages		12.60	11.71		8.60	10.46

TABLE 97.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT IN 1899

Plot row No.	High protein.			Low protein.		
	Register ear No.	Protein, percent.		Register ear No.	Protein, percent.	
		Seed ear planted.	Crop harvested.		Seed ear planted.	Crop harvested.
1	309	13.21	12.04	303	8.66	9.87
2	309	13.21	12.07	303	8.66	10.53
3	310	13.34	12.86	304	8.62	9.39
4	310	13.34	12.24	304	8.62	10.01
5	311	14.05	12.70	305	8.57	9.60
6	311	14.05	12.00	305	8.57	8.74
7	312	14.92	12.74	306	8.29	9.70
8	312	14.92	12.86	306	8.29	9.33
9	313	14.25	12.02	307	7.85	9.36
10	313	14.25	12.04	307	7.85	9.22
11	314	13.46	11.33	308	7.50	9.03
12	314	13.46	12.12	308	7.50	9.06
13	315	13.25	11.16	311	8.32	10.11
14	315	13.25	11.39	311	8.32	9.10
15	316	13.12	11.10	312	8.58	9.40
16	316	13.12	11.63	312	8.58	8.82
17	317	13.04	12.09	314	8.82	9.29
18	317	13.04	12.45	314	8.82	10.00
Plot averages		13.63	12.05		8.36	9.47

TABLE 98.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT IN 1900

Plot row No.	High protein.			Low protein.		
	Register ear No.	Protein, percent.		Register ear No.	Protein, percent.	
		Seed ear planted.	Crop har- vested		Seed ear planted.	Crop har- vested.
1	408	13.87	9.54	404	8.08	8.18
2	409	13.94	11.10	405	7.98	8.36
3	410	13.97	10.32	406	7.74	7.68
4	411	14.41	11.55	407	7.49	7.81
5	412	14.78	10.78	408	6.66	7.57
6	413	14.53	11.87	409	8.47	7.68
7	414	14.24	10.19	410	7.60	8.56
8	415	13.93	10.64	411	7.83	7.96
9	416	13.89	10.88	412	8.03	7.79
10	417	13.89	11.18	413	8.18	7.88
Plot averages		14.15	10.81		7.81	7.95

TABLE 99.—PROTEIN IN ONE HUNDRED THIRTY-SEVEN PAIRS OF EARS GROWN ON MIXED-PROTEIN PLOT IN 1899

Plot row No.	Hill No.	Protein, percent.		Plot row No.	Hill No.	Protein, percent.	
		From high-protein seed.	From low-protein seed.			From high-protein seed.	From low-protein seed.
1	4	9.65	12.13	8	15	13.86	9.76
1	6	13.90	10.50	8	16	14.41	9.73
1	7	12.75	9.80	9	7	10.48	7.48
1	8	11.51	9.54	9	9	10.89	11.54
1	9	10.25	9.79	9	10	12.03	8.56
1	13	11.53	8.18	9	10	10.07	7.35
1	13	11.89	8.44	9	11	14.25	8.92
1	14	14.89	9.98	9	13	11.26	8.21
2	1	12.94	9.09	9	14	13.62	7.33
2	3	12.73	10.40	9	15	12.35	7.71
2	4	13.22	8.27	9	15	10.34	9.38
2	7	10.51	9.81	9	16	14.03	14.03
2	10	9.89	7.87	10	2	10.45	7.75
2	11	10.98	14.71	10	3	12.49	13.32
2	12	14.76	11.53	10	7	12.40	7.62
3	3	12.83	10.26	10	9	11.15	7.64
3	5	12.16	9.22	10	10	10.74	9.14
3	6	12.78	8.76	10	13	11.48	11.86
3	7	11.92	9.45	10	14	13.50	8.22
3	8	10.51	9.88	10	15	12.26	9.27
3	8	9.15	7.89	10	15	13.30	8.27
3	11	13.77	10.10	11	2	11.88	8.78
3	12	14.80	8.99	11	5	9.58	9.92
3	14	13.51	11.05	11	6	11.77	10.61
3	16	15.18	9.51	11	10	9.98	7.25
4	8	8.37	9.63	11	11	9.76	7.81
4	9	13.44	10.17	11	12	10.58	9.57
4	11	11.79	8.53	11	13	12.55	8.75
4	14	12.77	11.21	11	14	11.38	9.26
4	15	12.84	9.78	11	14	12.09	9.43
4	16	13.21	9.85	11	15	11.48	7.57
5	4	11.26	7.91	12	1	12.86	9.83
5	5	13.80	8.33	12	5	11.95	11.07
5	5	11.18	10.42	12	7	12.05	8.81
5	10	14.06	10.38	12	8	12.23	8.45
5	11	12.88	9.28	12	8	12.25	8.72
5	14	12.68	11.73	12	9	13.29	8.09
5	15	14.04	9.07	12	11	8.93	8.41
6	6	12.07	9.88	12	13	11.66	8.08
6	7	11.12	8.07	12	15	12.72	7.83
6	9	12.30	7.94	12	16	11.47	9.85
7	9	14.33	8.82	13	3	10.59	10.91
7	10	10.84	9.86	13	7	11.67	9.11
7	11	12.45	8.58	13	8	10.66	11.25
7	11	9.56	9.35	13	9	11.47	7.74
7	12	10.77	8.92	13	9	8.27	8.17
7	14	14.21	9.51	13	11	11.22	10.05
7	15	15.15	12.01	13	15	10.21	9.19
8	8	12.05	9.52	13	16	12.41	11.28
8	9	13.47	8.51	14	4	12.43	8.26
8	10	9.60	8.77	14	7	12.35	9.52
8	13	12.59	8.26	14	8	10.52	9.14

TABLE 99.—Continued.

Plot row No.	Hill No.	Protein, percent.		Plot row No.	Hill No.	Protein, percent.	
		From high-protein seed.	From low protein seed.			From high-protein seed.	From low-protein seed.
14	11	11.32	9.09	16	15	11.77	9.92
14	12	9.37	9.08	16	16	12.18	9.51
14	13	10.21	8.36	17	1	10.73	9.99
14	13	11.18	8.25	17	7	10.29	9.71
14	15	12.56	9.46	17	7	12.11	8.92
14	16	10.96	9.94	17	8	12.69	8.12
15	3	10.96	8.65	17	10	13.00	9.04
15	7	11.76	8.91	17	12	12.48	8.85
15	9	9.18	7.74	17	14	12.05	11.00
15	12	11.67	9.68	17	15	13.01	7.57
15	15	11.12	12.48	17	16	12.54	9.45
16	7	12.51	9.32	18	4	14.14	11.17
16	9	11.11	9.06	18	9	11.73	10.84
16	11	11.50	8.39	18	10	14.19	9.66
16	12	10.93	7.45	18	12	9.28	8.51
16	13	12.20	7.46	18	16	13.44	10.35
16	14	10.26	8.15				
Averages						11.92	9.34

TABLE 100.—OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1898

Plot row No.	High oil.			Low oil.		
	Register ear No.	Oil, percent.		Register ear No.	Oil, percent.	
		Seed ear planted.	Crop harvested.		Seed ear planted.	Crop harvested.
1	207	5.20	4.66	205	3.39	3.60
2	210	5.44	4.87	206	3.39	3.86
3	212	5.68	5.38	207	3.38	4.13
4	213	5.49	5.14	208	3.50	4.20
5	215	5.43	5.35	209	3.70	4.06
Plot averages		5.45	5.08		3.47	3.97

TABLE 101.—OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1899

Plot row No.	High oil.			Low oil.		
	Register ear No.	Oil, percent.		Register ear No.	Oil, percent.	
		Seed ear planted.	Crop har- vested.		Seed ear planted.	Crop har- vested.
1	305	6.47	5.09	304	3.56	3.81
2	305	6.47	5.08	304	3.56	3.92
3	306	6.71	5.27	308	3.22	3.89
4	306	6.71	5.09	308	3.22	3.83
5	307	6.49	5.03	310	3.33	3.73
6	307	6.49	5.33	310	3.33	3.85
7	308	6.34	5.04	311	3.35	3.72
8	308	6.34	5.44	311	3.35	3.76
9	309	6.09	5.07	315	3.64	3.95
10	309	6.09	5.37	315	3.64	3.88
Plot averages		6.42	5.18		3.42	3.83

TABLE 102.—OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1900

Plot row No.	High oil.			Low oil.		
	Register ear No.	Oil, percent.		Register ear No.	Oil, percent.	
		Seed ear planted.	Crop har- vested.		Seed ear planted.	Crop har- vested.
1	402	6.21	5.61	404	3.45	3.93
2	403	6.22	5.74	405	3.42	3.78
3	404	6.35	5.88	406	3.31	3.73
4	405	6.42	5.99	407	3.08	3.75
5	406	6.54	5.71	408	2.81	3.89
6	407	6.43	5.91	409	2.94	3.80
7	408	6.33	5.60	410	3.14	3.60
8	409	6.27	5.84	411	3.32	3.58
9	410	6.22	5.68	412	3.41	4.22
10	411	6.20	5.82	413	3.47	3.77
Plot averages		6.32	5.78		3.24	3.81

